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ENGINEERING PSYCHOLOGY

PROBLEMS IN ARTISTIC DESIGN EDUCATION

Moscow TEKHNICHESKAYA ESTETIKA in Russian No 7, 1977 pp 1-15

[Round-table discussion led by Dr Psych Sci V. P. Zinchenko, Corresponding Member of the USSR Academy of Pedagogical Sciences]

[Text] The problem of design today is to a significant extent a problem of designer education. This is why the editorial board of TECHNICHESKAYA ESTETIKA took the initiative to organize a "round table," inviting various specialists to it associated directly or indirectly with the problems of artistic design education-- educators, designers, philosophers, art historians, psychologists, and architects.

The following persons took part in the discussion: Candidate of Philosophical Sciences V. S. Bibler (USSR Academy of Sciences Institute of General History), Architect D. V. Gnedovskiy (Moscow Architectural Institute), Candidate of Art History A. P. Yermolayev (VNIITE [All-Union Scientific Research Institute of Technical Esthetics]), Candidate of Art History L. A. Zhadova (Central Training and Experimental Studio, USSR Artists' Union), Doctor of Art History G. B. Minervin ((TsNIITIA), MVKhPU [Moscow Higher Industrial Art School]), Candidate of Psychological Sciences V. M. Munipov (VNIITE), Candidate of Philosophical Sciences L. I. Novikova (USSR Academy of Sciences Institute of Philosophy), Candidate of Art History V. A. Pakhomov ((LVKhPU) [probably Leningrad Higher Industrial Art School]), Architect V. N. Plyshevskiy (Sverdlovsk Architectural Institute), Artist Ye. A. Rozenblyum (Central Training and Experimental Studio, USSR Artists' Union), Artist-Designer O. V. Sokhadze (Tbilissi State Artists' Academy), Candidate of Architecture Yu. P. Filenkov (VNIITE), Doctor of Art History S. O. Khan-Magomedov ((TsNIITIA)), and Artist-Designer D. N. Shchelkunov (VNIITE).

The meeting was chaired by USSR Academy of Pedagogical
Sciences Corresponding Member, Doctor of Psychological
Sciences V. P. Zinchenko.

The discussion held on today's important problems in
artistic design education should promote deeper considera-
tion of these problems and their solution.

The editorial board hopes that readers would respond to
the materials published here.

V. P. Zinchenko: The problem of designer education is so pressing and com-
plex that we cannot limit its discussion to traditional pedagogical systems.
We must examine it in the broadest educational context, looking at it from
various aspects and encouraging our educational institutions to assume new
initiatives and perform new experiments in this area.

Artistic taste alone will not promote success in a designer's activities.
We must have a theoretical, practical, and obviously an experimental basis
for laying the foundation for training in all areas of occupational activity.
What we must discuss is what the bases of the occupational activity of de-
signers should be.

As far as I can see, the principles of designer education have not been worked
out sufficiently as yet, and it is organized on the basis of traditions
which had evolved, for example, in the training of easel painters. Once
while I was visiting the Khar'kov Art School, which has been reorganized as
an industrial art institute, I talked with the institute directors and
acquainted myself with the occupational training system. It is entirely
obvious that after this art school became an industrial art institute, the
greater part of the training program remained as before--purely artistic.
It does not acquaint the student with industry sufficiently, and both the
institute management and the instructor staff still harbor unspoken protests
against any sort of transformations of this institute. I also believe that
the Mukhinskiy and Stroganov   schools cannot serve as models for professional
designer training either. At the same time this occupation is becoming in-
creasingly more widespread: The VNIITE card file contains a thousand and a
half designer organizations which, when multiplied by the collectives working
within them, represent many thousands of artistic designers. This is why
the problem concerning the bases and principles of specifically designer
education acquires such great acuteness.

Now the second side of the problem. Designers working at enterprises some-
times are not even aware of the word "design," not to mention the bases of
artistic design. Their road to esthetically tolerable plans is long and
expensive. Hence follows another important problem--that of training designers
at the design departments of technical VUZ's.

I believe that it would be best to approach the designer education problem
through a definition of the countenance of the profession--through a model
of the specialist. What is a designer? If he is just simply a talented

person, then the question as to the principles behind his education is an idle one: If he has talent, then he is a designer, and if he has no talent, then there is nothing that education can do to change him. But inasmuch as artistic design is becoming a widespread occupation, we cannot go very far relying on just talent alone. Apparently there exist some constants of designer activity which permit us to consider the model of a designer, lying at the basis of his occupational training.

Now the next problem. All occupational training must be based on certain fundamental principles, and the very nature of the training depends on how they are defined. This problem pertains not only to designer education. For example the idea that disciplines such as anatomy and physiology must lie at the basis of a psychologist's training have long reigned in our departments and schools of psychology, and this idea has defined the training program, the very nature of the training. Is this really correct? I believe not.

Today, psychologist training is structured not only on the basis of the natural sciences but also on philosophical and social bases--humanitarian bases in the broad meaning of this word. Engineering and mathematical disciplines are being included more and more frequently in the training program. But even this is not enough in my opinion. I believe that it would be very useful to base scientific psychology and psychologist training on an esthetic foundation. Psychologists often find that artists, writers, and art historians are centuries ahead of scientific psychology in their insights. Creating the psychology of the 21st century on the basis of previous art history does not appear to be a fantastic task to me. I mention this because I am convinced in the usefulness of psychology in designer training. Modern psychology has subdivisions devoted to analyzing various forms of activity, including creative activity, and today, psychology is dealing with the tasks of planning individual activity with continually better grounds.

Here is another important aspect of the problem--the question as to what should precede higher education--the question as to what should be offered in training in schools prior to admission to a VUZ, in the schools from which we obtain the greater proportion of future designers. The question as to the demands that can be imposed on pre-VUZ artistic design training is extremely pressing.

And so, we can agree on a preliminary understanding of the basic problems of our "round table":

1. A model of the designer, which can be placed at the basis of occupational training.

2. The fundamental principles for organizing artistic design education programs.

3. The didactic-methodological principles of designer training.

4. Pre-VUZ designer training.

Ye. A. Rozenblyum: The question obviously lies with what an ideal designer is, and what sort of education this ideal designer needs.

I think, first of all, that we cannot define a designer as a professional in some single specialty, and if we can and must define design singularly as a particular form of social activity, we must not forget that this singularity is of a unique sort: It is based on a superimposition of two different directions and, correspondingly, on differences typical of the specialists working in these directions.

In the roughest approximation we can note two directions within designer activity. One is represented chiefly by the artist, and it is precisely in this quality as an artist that he can remain ahead of scientific progress, as our respected chairman has stated. In view of this specific feature of artistic activity, design has a need for art.

But can we properly call an artist who can think figuratively and who bases his activity on the resources and methods of art a designer? The "Letatlin" does not fly, and the tower of the 3d Internationale has not been built. What, then, did Tatlin do? Tatlin predicted the future, though even predicted may not be the right word: He simply lived and created in the future. He dealt with forecasting, that ordinary artistic forecasting typical of any artist who lives in his own special time which he interprets on the basis of the trends of tomorrow having their roots in today; he is a person who creates, for himself, things which are more or less significant to others as well, depending on his talent, his interests, and his organic closeness to one group of people or another. Is this needed in a designer? It is. A designer is a specialist who places style in concrete terms, a person who creates an artistic conception of the objective world.

What is needed in a designer of this type? First of all he must be an artist, he must have his spectator, close to the designer and interested in him; he must shape the public opinion of his spectators and, as prominent designers of this direction say, he must make things for himself and permit their use by others. What sort of education does he require? An art education.

I personally believe that we must have specialization, but only in the senior years. Let me cite the experience of the Senega school of the USSR Artists' Union, which has now been in existence for more than 10 years. It attracts people who had never done design work but who are good artists; they find employment not only in planning museum exhibits or designing urban environments (objects which have always been close to the artist), but also in the planning of machines, which they are doing quite well. For example Galina Yakubovskaya, who had graduated from the graphic arts department, is now one of the major theatrical artists, but she decided to plan a machine and has created one of the plans which has initiated the "open-form" direction in our machine building and which has been exhibited successfully at domestic and foreign exhibitions.

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I am referring to training specialists in the system of Soviet design who would recognize, with increasing clarity, their organic tie with art, persons who see in this tie a guarantee of the effectiveness of their creativity. Recently an exhibition was held in Moscow by young designers of this direction, who declared outright that they were unified by a desire to view their activity as "artistic creativity based on design as a resource of artistic self-expression." PRAVDA wrote the following about this exhibition on 3 June 1977: "One senses that each of the exhibits is alive, perhaps because the creators had placed their souls into them, creating things with a singular desire—giving them to the people as gifts." This is the sort of designer we must train at the art VUZ and, perhaps, not in a special department but interdepartmentally. Now, in a time in which we are progressing toward environmental design, toward design requiring synthetic thinking, such a designer-artist, all creativity of whom is synthetic in nature, is especially needed.

The other type of designer represents that tremendous detachment of specialists who plan concrete articles at enterprises jointly with engineers, specialists who have before them a prototype of an article, or an article that already exists in the objective world, or an article initially created by a designer of the first type. This is the designer-engineer, and he must be trained at an engineering VUZ. A department at an engineering VUZ training designers must have its own special program. Earlier, when I had first become interested in this problem I chanced to come across a prerevolutionary drawing textbook for technical VUZ's. The number of hours devoted to drawing significantly exceeded the number of hours devoted to drawing by the design department of today's Stroganov school.

Such a designer-engineer, possessing certain resources of graphic art, is doubtlessly needed, but his style of thinking differs significantly from the thinking style of a designer of the first type. Designers are different, and as long as we fail to understand that they are different and refrain from confirming this as the foundation of designer education, we will continue to train artists at technical VUZ's and engineers at art VUZ's. Clearly, both ways are identically senseless. What do we get when we train a designer at an art VUZ, trying to subsequently employ him as a designer-engineer? The art VUZ does not instill either the artistic or the engineering type of thinking into the designer precisely because an attempt is made to combine these two styles of thinking. In this case the graduate of such a VUZ feels himself to be chiefly an artist, and his inability to work in art becomes a source of frustration to him for many long years. Meanwhile, when the designer-engineer is trained at an engineering VUZ, he views his principal occupation as being the most important, and he does not experience any difficulties. A positive example of training designers at an engineering VUZ can be found in the experience of the (NETI), the design department of which is now staffed by a collective of talented educators.

We must also raise the question as to the nature of planning, as to what planning is in general, the scientific basis of planning, the specific features of the thinking of a planner, and the planning aspects of philosophical,

sociological, poetic, and other forms of creativity. Were we to do so, we would be able to discuss, for example, the poetic planning of V. Khlebnikov. Were we to define the planning phenomenon, we would acquire a possibility for posing the following objective to education--creating, in any particular area, a specialist who would be able to perform planning as a specific form of research.

Here is what A. Efros said: "I do not know anything about this question: In order that I might gain an understanding of it, I must first write an article about it." This sounds like a paradox, but to the planner it expresses the basis of activity: He, the planner, must solve a problem for which the solution is naturally not known or provided beforehand. No one plans a problem that is already solved; a plan is always a search for a solution. This is why a plan has value as research that has already been conducted, even if it is not embodied within a concrete thing in the future.

And so, in my opinion the designer education problem breaks down into three questions: What should designer education be at an art VUZ? What should it be at a technical VUZ? How do we define the essence of the thinking of a planner and, consequently, its role within any form of activity, including that of a designer?

However, this sort of breakdown elicits certain difficulties. We need to organize complex interaction among all components of the design profession, and thus one of the problems is to determine how to organize this interaction.

One thing is obvious to me: Today, design does not exist as a singular profession, and the designer does not exist as a singular figure; as a form of social activity, design is the result of the efforts of various specialists.

Yu. P. Filenkov: But the artist does not exist as a singular figure either: There are sculptors, there are painters, there are graphic artists.

Ye. A. Rozenblyum: There are artists in applied art, there are theatrical artists, there are monument builders, and there are poster painters, and today we can continue this series by saying "There are designers." But this is another type of breakdown--a breakdown in which the importance lies not with that which separates but that which unites. Marx' well-known assertion that the unity of the artist's profession lies in the future, an assertion which corresponds fully to the trends of today's practice, is interesting in this aspect.

Yu. P. Filenkov: But does it really not make any sense to make a breakdown within a profession?

Ye. A. Rozenblyum: We can make a breakdown within a profession on the condition that the factors defining the unity of the profession are more significant than factors defining its breakdown. In this case the conditions for the breakdown may be expressed not only as the object of creativity but also as schools, directions, and trends of art. Such a breakdown is compatible

with the diversity of creativity; it brings the artist closer to his spectators, and the designer closer to consumers, making their work closer and more necessary to the people for whom they are working.

To what extent can we refer to the singularity of design--that is, to a particular type of activity different from all other types?

I think that this singularity can be established relative to the object of this activity: We must look at the extent to which the designer involves himself in conscious and purposeful formation of man's way of life through the material culture and the objective world surrounding him--that is, the extent to which the designer is a specialist in human demands for a spiritually full material environment.

But as soon as we examine the question as to this environment specifically, we find that breakdown of the designer occupation into different directions-- artistic and engineering--is fundamental.

Design today is not a single occupation; it is a system of occupations having its own subsystems, each of which must be prepared in the appropriate manner, in different ways. Were we to clearly define these subsystems, we would then be able to determine the range of occupational training required.

V. M. Munipov: If design is a system of occupations, what is the system-forming factor?

Ye. A. Rozenblyum: I believe that depending on different cultures and different social and occupational conditions, the system-forming unit is always found to be different, and sometimes entirely unexpected. To me, artistic design is such a system-forming factor. But this is very debatable at least because the quantitative distribution does not lean in favor of this factor. Moreover although scientists occasionally assert that it is precisely art that anticipates the future, people of art place the same hopes on science. In a certain situation, today's in particular, scientific planning or, more precisely, planning as defined theoretically, scientifically, may be the system-forming unit.

D. V. Gnedovskiy: It does not make any sense to prove a universally recognized trend, that design has now moved from a stage of forming things to a stage of forming the environment. The totality of knowledge about this environment and the laws governing formation of its elements must be placed at the foundation of the designer's occupational training correspondingly. This knowledge should include demography, sociology, economics, and the prospects for development of architecture and the construction base. The designer must possess serious engineering training, beginning with materials strength, materials science, and production processes, and ending with mastery of the technical resources of planning. The designer must be a broadly educated and erudite person; he must know the history of culture in general and the history of art and architecture in particular. Finally,

the designer must be characterized by developed three-dimensional thinking, and he must have the occupational skills of an artist. Only a symbiosis of all of these abilities and this knowledge can become a substantial foundation for the principal discipline for which a creative VUZ is specialized--training in planning procedures.

Only a single VUZ--the architectural VUZ--and the system of architectural education in general provide such broad fundamental training today. This is why it seems to me that the training of a designer must be structured on the foundation of an architectural education, and not an art education, one that is principally artistic, inasmuch as besides not providing any knowledge in the disciplines I have listed, an art education creates that sense of frustration in the designer which Ye. A. Rozenblyum discussed. The problem is that the title of artist is, in addition to the name of a certain occupation, a symbol of a God-given gift. "I am an artist" is equivalent to the declaration "I am a poet." This distinction does not exist in architecture. Although a student of an architectural VUZ works on his projects individually, he is trained not as a soloist, but rather as a member of an authors' collective.

After receiving his art training in the Stroganov school, a designer plans interiors, "sets," and articles seen in art salons--that is, he is a designer--planner of an individual, unique thing. Do we need articles that carry the imprint of the hands of an artist, of his taste, and his individuality, do we need unique things? Of course we do, but this is no longer the field of a designer as such; it is the field of applied art. This is why a designer trained only in the arts perhaps cannot be permitted to plan anything beyond things having to do with tastes alone, coffee house interiors, and furniture.

There is another argument in favor of training designers at an architectural VUZ. The time when architects drew furniture for their own buildings has passed. They no longer have time for this. Situations in which an architect and a designer are working on an object as a single collective, mutually enriching and influencing one another, are practically excluded. These specialties are separate in organizational terms, but the work of such specialists comes together when they create the objective and spatial environment of a residential, public, or industrial building. Integrity can be achieved in creation of such an environment only after its creators develop common viewpoints, common principles of its formation. This task can be completed through joint education of the designer and the architect inside the walls of a school of architecture.

However, is our school of architecture ready to educate its students as designers? I can say quite categorically, it is not ready. The experience of the Sverdlovsk Architectural Institute, which contains a design department, would be interesting to study and generalize. Today the department specializes in planning articles for industry, but soon its program is to be expanded, to include cultural and personal articles.

On what basis should designer training be structured in an architectural school? I feel that this training must be fundamental, and it must produce

a designer with a comprehensive education. It is only his last years that a student would choose a specialty, but his diploma should not indicate that specialty. In the future, the designer's life itself will determine what he will do. But his basic training must be structured in such a way that he would be competent in industrial graphic arts, in artistic design, and in interior design.

Ye. A. Rozenblyum: I would agree with your assertion, were it not for the fact that architecture itself is experiencing the same problems as design, were it not for the fact that in 1956 architecture, divorced from art, had issued forth numerous "Cheremushki," a name which we use today not only to express the shortcomings in the state of architecture and architectural education but also to express a negative evaluation of the vulgar understanding of functionalism in design.

The errors in architecture are understandable; architecture has once again returned to the ranks of the arts, and it was precisely recognition of these errors that placed, before architecture, the same problems of interaction between that which is artistic and that which is technical typical of design. If we could borrow something from architecture today, it would only be the experience of its errors.

A. P. Yermolayev: In order to orient ourselves better in relation to what a designer is, I would suggest that we examine the designer's occupation and his education from the standpoint of diverse practical requirements--those of consumers, production, and the society. From this point of view the institutions of higher education, which are the forges of professionals capable of solving today's problems, developing the techniques themselves of planning, and creating new artistic valuables, simultaneously hold the prospects of design. The designer planning environment awaits from the VUZ, from the specialists it trains, a positive criticism of material and spiritual culture, suggestion of new resources and methods of planning, and the boldness of an explorer. Meeting these diverse expectations, the designer has a possibility for revealing his own preferences and interests.

The numerous demands placed on a designer are embodied not within the mythical figure of a jack-of-all-trades designer--a thinker, an artist, an engineer-- but rather in a real set of design specialists showing particular interests in invention, in creation of forms, in research, or in visualization, persons specializing in designing transportation resources or consumer goods, industrial graphic art or visual communication, in planning interiors, or furniture, or fabrics, or glass, or ceramics.

Modern education must afford the individual a possibility for selecting that which is most in line with his capabilities, with the specific features of his nature. What we need within a VUZ is "natural selection," differentiation of students in relation to their interests, separation and specialization of these students. The problem lies in my opinion not in differentiating between artistic and artistic-technical VUZ's but rather in creating an atmosphere permitting diverse orientation in design.

The solution to the problem of educating a designer and developing his capabilities rests basically with the teacher, with his qualities as a teacher and creator. It is only through the teacher's personality that a student can truly gain an interest in design. The teacher is a guide in the system of knowledge, abilities, and feelings present within the process of joint planning. The teacher must be a participant of the planning process. This would be possible when the teacher himself is capable of formulating and implementing his own premises of teaching.

I think that despite the obvious fallaciousness of a jack-of-all-trades designer and despite possible differentiations of designer occupations (designer-artist, designer-planner, designer-thinker), there is something common that is inherent and necessary to the designer irrespective of his specialty--that which has come to be called the system-forming factors of the designer occupation, the yardstick with which we assess the results of a designer's activity, the nature of training processes, and the capabilities of a person beginning to work in design.

What is this common thing?

There can be no doubt that the creativity of design is the creativity of art. A designer is, first of all, a reflecting, deliberating artist who thinks in plans.

The capacity for deliberating, the capacity for reflecting is an important quality of a designer. It manifests itself in two ways--first as the ability to envision the structure of an object (its content, arrangement, color, its graphic representation, its color and shadow contrast, and so on) and the structure of his activity, and secondly as the ability for building a structure out of certain elements prescribed by the structure itself. In a VUZ, the student learns to understand and build various sorts of whole objects intended for diverse practical tasks.

From this point of view we can understand the purpose of entrance tests for applicants: Their purpose is not so much to reveal a student's ability to draw a given shape or solve brainwracking problems as it is to reveal an interest in mastering the illustration as a resource for expressing some particular prescribed structure of an object, as well as an interest in composition--"purposeful creation of a whole object" (a definition suggested by Polish educator Voytsekh Yastzhembovskiy). I believe that the capability for structuring, for purposefully building an integral object is basic to a designer.

Correspondingly, from my point of view the meaning of design education lies not so much in acquisition of various knowledge and information as in acquisition of the capability for orienting one's self within the design system, within the range of design problems and the resources for their solution, acquisition of a capacity for selecting the path toward a solution and shaping the resources of solution. More precisely, the designer must master the means of establishing contact between a planning problem and the arsenal of resources promoting its solution.

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The ability to build integral objects on paper is associated with the need
for mastering visual techniques affording the designer a possibility for
making use of the resources by which to organize the visual environment,
for visually reconstructing material-artistic, including historical, objects,
the capacity for thinking visually, including "thinking with a pencil in
hand."

However, it seems to me that we can solve these problems only in the event
that we significantly reorient the methods of VUZ work.

First of all we would have introduce the problematic teaching method, in
which the training process proceeds from a planning task to shape-forming
problems and then to knowledge that can be used to solve planning problems,
and not from lectures to training assignments.

Second, much more room should be given in the training process to introduc-
tory training. By introducing introductory training we erase the border
between exercises and productive work, making exercises a way of solving
real problems. Comprehensive introductory training is not only a method
for teaching disciplines in the composition and graphic arts cycle; it is
also a way to introduce students to the social, cultural, and artistic
problems of design. Finally, introductory training should be continuous
and comprehensive, occurring throughout the entire training process.

L. I. Novikova: We can reach a solution to the problem posed here through
critical analysis and generalization of the existing experience in designer
education, and through creation of an ideal model of a designer. Obviously both
of these approaches supplement one another. In today's discussion I would
like to take the second approach--from an ideal model of a designer to the
objectives of designer education. There is a large gap today between the
romantic image of a designer--a free artist who, as God, creates a second
world, and the real practicing designer. As an example I have had the
occasion to hear the following from practicing designers of the Plant imeni
Leninskiy Komsomol and the Sverdlovsk Special Artistic Design Office:
"How can you talk about creativity? We are workers." Consequently we need
a realistic model that would reduce this distance between the designer-artist
and the practicing designer.

Let us try to formulate the basic initial premises of this model.

First, design is a modern, mass occupation embracing all sectors of indus-
trial production, and consequently the task is not to orient the VUZ's
toward nurturing geniuses but rather toward providing occupational training to
students at the level of modern requirements on scientific and technical
work and the culture of a developed socialist society, though without a
doubt professionalism should not close the door to self-expression.

Second, the designer's occupation is fundamentally new, and for this reason
it would hardly make sense to reduce it to old forms of classical education,
be they artistic, architectural, or technical. We have talked about the

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crisis in classical art education, which fails to satisfy the modern require-
ments of artistic design. I think that both engineering-technical and
architectural education are also experiencing similar difficulties in the
face of the requirements of scientific and technical work. It is no accident
that we are now conducting an intensive search for new organizational forms
for higher education, and that we are strengthening its ties both with
scientific research institutes and with production. It appears to me that
precisely in view of its novelty and absence of restraining traditions,
designer education must serve as a unique testing range in which we could
seek new organizational forms satisfying the requirements of scientific and
technical work and the goals of communist construction.

Third, the designer's occupation is fundamentally new, in my opinion, in that
being singular in terms of its goals and methods, this occupation is simul-
taneously collective in terms of the way the activity is organized. Thus
it would hardly be valid to talk about a fundamental difference between the
occupations of (and, correspondingly, between occupational training for) a
designer-artist and a designer-engineer. The unity of these occupations
is embodied within the name itself of the new occupation--artist-designer.
The fact that designer activity is organizationally differentiated into
artistic design, industrial design, planning-methodological (theoretical
in essence) and art expert evaluation services. Apparently, designer educa-
tion must account for this differentiation, subordinating it to the common
goal.

But what does in fact define the integrity of designer activity? Let us
examine the presently accepted definitions of design. One of the definitions
of design formulated at the time of this occupation's formation asserts that
design is industrial art having the goal of creating beautiful things.
But then, first, how do we define the beauty of a thing, how do we relate
the beauty and the function of a thing, and what is the function of beauty
itself? Second, are we not settling on the path of "consumer" design when
we take such an approach? Another more up-to-date definition of design is
"the planning of the objective environment." In this approach we imply a
direct analogy with architecture in terms of planning a three-dimensional
environment. It appears to me, however, that this analogy is incomplete.
The three-dimensional architectural environment has a constant, static
nature. Architects refer to its mobility as a problem. A thing, meanwhile,
a technical article all the more so, is a resource of human activity in-
cluded within this activity--that is, it is active by nature. By equating
the objective environment with the three-dimensional architectural environ-
ment we ignore this significant functional difference between these environ-
ments.

Basing myself on these initial premises I will try to formulate a definition
of design which, if it is to correspond with reality, must determine the
strategy of designer education. Design is objective organization of man's
free vital activities, and not organization of the objective environment
in and of itself. The difference between "objective organization" and

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"organization of the objective enviroment" might appear small. But in this definition we shift the accent from an object, viewed as the end result of artistic planning, to activity, which must be embodied within this object. In this case things, technical articles, are only the resources man uses to act today, directing his activity toward tomorrow.

V. P. Zinchenko: Does this mean that if a television exists it must be watched, that if an object exists it invariably must be used?

L. I. Novikova: Yes, of course. A thing undergoing planning must be intended for activity with it. It is for this sake that it is produced. If a manufactured thing (a television set or a machine tool) is not included in a system of subsequent activity, it simply transforms into a cemetery of natural and social resources irrespective of where it is--in a warehouse containing unsold products, in a packed-up production section, or in the apartment of the average man who acquired it. Basing ourselves on these premises, we can productively solve the pressing problem of oversaturating the surrounding environment with things: Human activity has an optimum though movable limit of saturation by objects, and it does not at all require a tremendous quantity of things. It is only on the basis of these premises that we can surmount the consumer trend that is so typical of bourgeois design.

As soon as we shift the accent from things to activity we change the objective of designer planning: What we subject to planning is not the thing itself but rather the means of activity with it, the individual's behavior in relation to the thing.

By wording the objective of artistic design in this way we define the basic content of designer education:

A cycle of social disciplines studying the laws governing human activity and social behavior (philosophy, social psychology, political economics, ergonomics, and so on);

a cycle of technical disciplines studying production processes and the resources of activity (the fundamentals of production processes, the theory and history of machines, general planning theory, and so on);

a cycle of esthetic disciplines (esthetics, art history and theory, the esthetic problems of a material culture, the theory and practice of artistic composition, education). These three general education cycles must be integrated by a cycle of specialized disciplines which we usually refer to as "technical esthetics." In my deep conviction an artistic-esthetic basis is the system-forming element of this cycle. This can be explained as follows.

While when we plan a thing or a technical system of any complexity whatsoever we can employ calculations, working with concrete magnitudes, when we plan future human activity with this thing we cannot accurately account for a

parameter such as human behavior. The planner can only presuppose the
individual's possible behavior. The extent to which this hypothesis corres-
ponds to reality will grow exponentially depending on the complexity of the
object, its series, its time of use, and on changes in the general situation
of activity. The method of artistic planning permits us to "graph" all of
these variables and mentally play through all of the probable "moves" in
the individual's behavior, moves containing an element of independent action.
In my opinion the basic (intrinsic) objective of design is to account for
and include, into the purposeful objective activity of an individual, his
unregulated and unpredictable behavior, activity beyond the bounds of its
original intent--that is, the basic objective of design is to translate
purposeful activity into a plan of independent action. This objective is
reached through the esthetic value of the article.

In this connection I would like to turn our attention to the special role of
artistic thinking. Sometimes artistic and visual thinking are treated as
synonyms. It appears to me that this is not entirely accurate: Visual
thinking is, after all, imaginary or spatial thinking only. On the other
hand when we refer to artistic vision we imply a unique sort of stage manage-
ment: By using things, we create a compositional structure within which a
certain variant of a situation must be played out. A thorough art education
is precisely what develops such artistic thinking.

And, finally, the last point. Inasmuch as design is a new occupation, designer
education must be structured in a new way. Sociologists are now talking a
great deal about scientific-production complexes. It would also be valid,
apparently, to discuss a scientific-production-educational complex, in which
the training of a future specialist would be conducted on the basis of
planning activity in scientific research. In this system, education could
be viewed as experimental activity following the activity of artistic plan-
ning. That which is impossible for a practicing designer, who must complete
a certain assignment, would be possible at the level of artistic design
shops, in which projects would be worked on with a certain amount of freedom
from social, economic, and other necessities. It appears to me that we
should raise the issue of creating such a new complex rather than injecting
new content into the framework that has already evolved.

V. M. Munipov: But if we define design as objective organization of activity,
how do we distinguish it from other forms of objective organization of activity,
from ergonomics for example?

L. I. Novikova: It appears to me that ergonomics is an invariable part of
the cycle of designer education. But while behavior is viewed as mandatory
and necessary in ergonomics, artistic resources afford the designer a possi-
bility for allowing for free, unproductive action by the user of the particu-
lar thing--that is, for behavior that is not rigidly prescribed. In general,
human activity is unique precisely in terms of such allowances for possible
but not necessary behavior. Progress becomes possible when we stray beyond
the bounds of prescribed situations.

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G. B. Minervin: I would like to clearly formulate two premises which appear to me to be significant to a discussion of the problems of artistic design education.

First, from my point of view there cannot be two forms of design, and there cannot be two forms of architecture. Second, without well-organized occupational education we would be unable to train either a good architect or a good designer.

I would like to say a few words about the Stroganov school. Certain serious though insufficient changes in the teaching of artistic design have recently occurred in the Stroganov school. In my opinion today's training plan opens up certain possibilities for improving artistic design education.

The traditional disciplines of the training plan have been supplemented by two new cycles--the theoretical fundamentals of artistic design, and a technical cycle. In addition the traditional artistic cycle naturally remains.

As you can see, artistic design education continues to be broken down into a number of cycles, sometimes poorly tied in with each other. This is obviously one of the significant shortcomings of this education, since all of these disciplines must be fused into a single unit in the consciousness of the artist-designer. Thus the problem is to find a suitable way to bring them closer together.

What is being done to solve this problem in practical terms? All of these cycles must prepare the student for his principal work--planning. Hence arises a certain possibility for bringing the cycles closer together. This issue has been examined at a number of conferences on artistic design education, particularly at a conference in Sverdlovsk, the main problem of which was the teaching of engineering disciplines to the artist-designer, and at a conference in Tbilisi devoted to the problems of teaching theoretical disciplines to students enrolled in artistic design departments.

Today, the technical cycle is taught basically as before, since it is taught by engineers who make no attempt at adapting this cycle to the needs of artistic design. In passing, I would like to say a few words about the VNIITE. It appears to me that the VNIITE should direct its efforts not at the student but rather at the teacher, it must work with teachers, since one of the basic difficulties in artistic design education is the absence of specially trained educators.

The theoretical cycle of the Stroganov school is rather extensive; it includes six disciplines:

Introduction into the specialty--what design is, and what its task is (six lectures in the first year);

the problems of form, including composition (first year);

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color vision and the physics of color. An attempt is presently being made
to improve the teaching of color vision and color physics, since no one
is happy with the way these disciplines have been taught to date. Inasmuch
as such a course has never been developed yet, each instructor in the
planning department is trying to create his own course in color physics,
one which is introductory in part and which, in part, develops color vision
theory further;

a discipline which we have arbitrarily named functional analysis. This is
essentially preplanning analysis. It is not enough to teach the future
planner synthetic planning; he must also be trained to analyze a problem
posed to him--that is, we must make him participate in presenting the prob-
lem. I think that planning work should be subdivided generally into two
parts--preplanning analysis and synthetic planning. The goal of teaching
functional analysis is precisely to impart the basics of preplanning analysis,
though the course does cover a broader area: It also includes formal and
compositional analysis;

ergonomics. It is very important for the designer to have a knowledge of
ergonomics, but certain questions do arise: How should it be taught?
Should it be taught in its full volume? First, this is a rather difficult
subject for a student at an art VUZ; second, what is important for us is to
tie ergonomics in with planning. Thus we solved the problem as follows:
Reveal the groups of tasks worked on in artistic design, and demonstrate
how each group satisfies specific ergonomic requirements--that is, in the
Stroganov school we turn our attention not to how ergonomics attacks its
own problems but to how the data that have been acquired can and must be
applied in practical work;

and, finally, in the senior year, production esthetics. This theoretical
course has not been standardized as yet; the question as to the theoretical
minimum which must be taught to the students is still under discussion.

As far as planning is concerned, a standard program has been created in the
Stroganov school, it has been approved by the teaching council, and it has
been submitted to the Ministry of Higher Education for approval. The program
is structured on the principle of growing complexity of problems from one
project to the next. Moreover it contains a certain set of different prob-
lems permitting the instructor some freedom in varying the course.

What are the basic shortcomings of artistic design education? The first, in
my opinion, is that despite various attempts at creating standard programs,
the process of artistic design education basically continues to proceed
spontaneously. Second, the theoretical base is not sound. Creation of a
sound base for such education must begin with definition of its fundamentals.

For example, how should history, the history of architecture in particular,
be taught? At the moment the course consists of an assemblage of facts and
a description of the morphology of things; what is important to the future
specialist, however, is to gain an understanding of the history of architecture

as the history of activity filtered through development of the objective world. Such an understanding of history is still absent both in architecture and in artistic design. There are gaps in development of the general premises of architecture and design. We recently completed work on "Osnovy teorii sovetskoy arkhitektury" (Fundamental Principles of the Theory of Soviet Architecture) at the Institute of the Theory and History of Architecture. If this work is approved, we plan to reword it into a short course of instruction. Gaps also exist in the problem of controlling and organizing planning affairs in design: The student receives no knowledge at all in this important area, which has considerable national economic significance. There are also problems in teaching the fundamentals of form, which are presently reduced to the fundamentals of composition.

I believe that we cannot do without a definition of beauty in the teaching of artistic design. And no matter how difficult it is to define it, it must be discussed with the student at least at the level of common sense. The future designer must understand the relationship between the harmony of form and the value of a thing, without which he would never be able to work successfully in design.

V. A. Pakhomov: The experience of development in design and some predictions confirm that highly diverse functions are inherent to design, including communicative, coordinational, artistic-esthetic, economic, heuristic, scientific research, prognostic, educational, social-cultural, ideological, normative (regulatory), descriptive-representational, and other functions. A designer's activity is always associated in a certain fashion with these functions, as well as with a large number of requirements imposed on analysis and development of elements in the objective environment surrounding man--requirements pertaining to typology, industrial design, ergonomics, patents and legal affairs, analysis, and many others.

Inasmuch as designer activity is directed at optimizing man's objective environment with a consideration for a set of factors pertaining to production, consumption, and the artistic-esthetic integrity of this environment, by its essence it has an intersector nature. Considering this, designer activity must be optimum in relation to the form, structure, and function of the products, which is the result of synthesis of the factors and requirements listed above. The form of the product of design is what represents the numerous aspects of its content. Another extremely important point is that designer activity is research on and development of articles and their systems, manufactured by industrial production methods and intended for use by man. Therefore I interpret design as polyfunctional creative activity having the goal of studying and developing the structures and forms of articles and objects optimum in relation to function, articles and objects existing as elements and systems manufactured by industrial production methods with a consideration for the set of factors operating within the "man--object--objective environment" system.

The designer's education must be structured on the basis of an integral system of training disciplines, to include:

A subsystem of disciplines in the sociopolitical cycle presenting the fundamental principles behind the laws and scientific methods of the social, historical, and natural sciences;

a subsystem of disciplines in the artistic cycle, developing occupational skills in the graphic arts, in design planning, and in chromatic, three-dimensional, and compositional thinking;

a subsystem of special disciplines shaping ideas concerning the theoretical and methodological problems of design;

a subsystem of engineering-technical disciplines providing the necessary knowledge in industrial design, economics, ergonomics, and patents and legal affairs;

a subsystem of disciplines developing work skills.

In this case it is extremely important to reveal the specific features of designer planning, manifested in its integrating nature and promoting mutual penetration and mutual dependence of different aspects of the theory and practice of planning.

From my point of view the education of a designer must be structured on the basis of clear coordination and mutual association of disciplines; moreover this association can be both linear and nonlinear. There can be no doubt as to the need for a linear succession in the study of, for example, compositional laws governing evolution of form within the framework of a planning course: Exercises on compositional organization of a plane followed by transition to levels of greater complexity--organization of space, and, finally, exercises in organizing forms in space and time.

On the other hand the cycles of sociohistoric sciences, engineering-technical sciences, and so on can proceed in parallel. In this case the different disciplines and their cycles must be oriented toward the particular occupation with a consideration for the student's future activity: The mutual association, continuity, and mutual "work" of the disciplines must be revealed.

The possibilities for collective guidance to the students in the "Planning" course, in which instructors from different departments contribute to work on planning assignments in the course, are interesting in this sense.

A designer must know the history of material-artistic culture, the history of styles, and the history of different ways of life, and on the basis of this knowledge he must develop an active, creative attitude toward the objective world, since he is shaped depending on the concrete historical conditions. I think that in the foreseeable future, the objective environment will have an even greater influence on shaping of the individual and

of his attitude toward work, leisure, personal life, and cultural values. Therefore a knowledge of the sociocultural and national economic aspects of design is extremely important to the student. Moreover he must be aware of the mutual relationships among elements in man's objective environment, technical and economic possibilities, and the needs of the society; he must be aware of the synthesis of the arts, and not only architecture, painting, and sculpture, as is commonly implied, but also design, without the methods of which creation of a harmonic objective environment would be unimaginable today and in the future.

Today, one of the shortcomings of designer education is poor introductory training in research and in design specifically. Introductory exercises in organizing planes, volumes, and spaces, and introductory exercises pertaining to space-time relationships (which are presently treated apart from planning itself) must accompany the planning course from the first year of study to the last.

Thus today's designer must be trained from all aspects, and he must possess artistic, engineering, and scientific knowledge. The designer must possess the skills of scientific analysis and creative synthesis of designer problems. In this case the scientific approach and an awareness of the objectives and pathos of the occupation must be shaped in the student during the training process. He must understand the breadth and perspectives of his future activity, he must learn to view problems from a systems standpoint, and he must have a facility with the methods of systems analysis.

What we need here is a very delicate approach, a sense of measure. An incorrect understanding of the "superobjectives" of one's own activity often leads to attempts at solving the problems of others at the expense of one's own problems. There must be an awareness of the goals and objectives of design, oriented at optimum human vital activities, since man is what we use to gauge all things he produces.

We need a clear understanding of the specific features of socialist design, manifested as development of things truly needed by the individual and the socialist society, corresponding to the individual's interests and needs, and nurturing his taste, visual culture, and his capability for solving national economic problems.

Yu. P. Filenkov: Designer activity can be defined as formation of the conditions for human life and activities through creative transformation of the objective environment. In this regard the designer is much closer to the architect than to the artist. Artistic practice is predominantly personal activity, and it is basically inventive, descriptive, and emotional. Design and architecture are predominantly collective, constructive activity organizing the real conditions of human life. Artistic practice fully exhausts itself with the objectives of art. Architecture and design are also related to art, but they hardly exhaust themselves with its objectives. Of course both designers and architects attach great significance to the emotional aspect of their activity, but it does not exhaust the content of their creativity completely.

Considering a commonness of creative interests, the occupational training of designers should be based on the centuries-old traditions of architectural education and not art education, since designers undergoing training at an art VUZ fail to acquire the entire arsenal of knowledge and skills they need. This generates a feeling of incompleteness and fails to nurture occupational pride, which is a significant shortcoming of designer training today.

We have not raised the issue as to the preliminary education of a designer during our "round-table" discussion today. This issue also deserves examination or at least introduction. I think that everyone would agree that a designer must be a creative human being. But the individual's creative thinking and activity takes shape long before he enters the appropriate VUZ. These qualities are shaped during childhood. If we are to heighten the level of occupational training for designers, we must place appropriate attention on early development of the personality's creative habits not only at the VUZ but also in grade school and even in nursery school. We must also turn attention to improving the present system for selecting VUZ applicants: Today, it does not in any way promote revelation of the creative potential of applicants.

What should the future designer acquire from his training at a VUZ? We have already discussed the occupational aspects of his training. I would like to add another two aspects to this problem.

If we recognize that the creativity of a designer is collective, then we should demand that the VUZ develop the habits of collective work in the students, or at least prepare them for such work. The collective nature of creative activity permits every designer to find his own place in the collective corresponding to his individual interests. Unfortunately, development of precisely such habits in students is clearly insufficient. Designers are still being trained as individual craftsmen, and thus when a former student enters the productive sphere he finds not only that he knows nothing about it but also that he fears it. As a result many graduates with special training as an artist-designer immediately seek retraining as free artists.

During his training, the student must develop and confirm his occupational creed and pride in his occupation. The problem with modern design schools, which have developed as a rule out of art institutes, is that they nurture not the traditions and specific features of design work but rather those of art, which differ in many ways. This hinders development of the necessary professionalism.

V. S. Bibler: I would like to state a few ideas concerning the two problems upon which all of today's discussion has been centered.

First there is the problem worded by Ye. A. Rozenblyum: Is there a singular designer today, or do two radically different designers exist--the designer-artist and the designer-engineer, the educations of whom are just as radically different? Yevgeniy Abramovich was told that there is a singular designer,

the ideal model of whom we must build and the principles of the education
of whom we must determine. I would combine these two assertions: Yes,
we need an ideal model of the designer, but this would be a model of the
conflicts within him, his incompatibility with himself. Let me explain
my idea. D. V. Gnedovskiy stated here that the principles of architecture
should lie at the foundation of the training of the singular designer.
I too believe that architecture and the architectural VUZ harbor the solu-
tions to the designer problem being discussed today at our "round table."
But only in the following sense: An architect must simultaneously be a
builder, an engineer, and an artist; however, these qualities do not combine
harmonically in the architect, existing instead in conflict, fighting one
another and tearing apart the architect's activity from within. To be an
architect-artist means on occasion to be involved only in the planning stage
alone, and this conflict tears apart modern architecture in precisely the
same way as modern design. This is why I believe that the idea that designers
should be trained in a VUZ of the architectural type is correct. I also
think that we should not try to soften this conflict; we should not try to
make the artist something less than an artist, and an engineer not just an
engineer. We should not try to create some sort of unity without conflict.
It appears to me that the tremendous merit of today's architectural model
of designer education lies precisely in the fact that in architectural
education, the ideal artist and the ideal engineer collide in irreconcilable
conflict, and that at the same time they unavoidably supplement one another.
That is what design is in its ideal expression. And, perhaps, design will
exist as design only as long as it reproduces this conflict within itself,
as long as the designer is an engineer and an artist at the same time, and
as long as he is unable to unite these functions. Consequently the ideal
model of the designer is, today, the architect characterized by his radical
internal conflict, by antinomic irreconcilability of his internal contradic-
tions.

But I would like to supplement this statement by turning it upside-down:
Today's architecture, in its ideal projection and with its need for including
various types of architecture within itself, to include nature within itself
as well, is developing in such a way that today's ideal of architecture is
design and its type of thinking. Today's architect must be trained at a
designer VUZ. This is the cultural mission of modern design.

Second, it has been stated here that a designer is a thinking artist. Artists
are naturally insulted by this, since they also think, especially modern
artists working not simply with visions but also concepts and knowledge.
However, there is one significant point in the stated assertion that a de-
signer is a thinking artist. Mayakovskiy's poem "Good!" contains the
following lines:

> And plans, which were earlier detained at the station
> of the mind,
> Arise today in the morning Sun, taking form in iron and
> stone.

Let us interpret the word "plans" as "designer plans." Then we would find that the designer must do something very strange: He must detain his plans "at the station of the mind." All of this work must remain at the planning stage, nonmaterialized.

A plan materialized as a thing dies, it does not exist in a thing, it remains as a part of the preliminary work. Matters are different with design thinking and design activity. In this case we create plans which must be materialized as things in such a way that they continue to be plans, objects of our activity, in such a way that theyremain incomplete and could yield to changes. This "detainment at the station of the mind" must take the form of precisely a detainment, a halt. It appears to me that creation of undying plans within things is a very important feature of design, important to our understanding of it, and important to the principles of design education.

Next, I agree that design is in many ways the conscious planning of the pattern of life; to put it another way, the pattern of activity. But I insist on all three words, "planning--pattern--life" and on their incompatibility, which is the objective of the designer.

First, a thing must be planned in a form such that the thing itself is a plan of our activity with it, moreover not a rigid plan but one permitting variations; a plan which permits us to view the thing itself as a plan, and not as a rigid tool forcing us to act in only this way and not in any other. Second, we must consider the planning of the pattern of life. When we talk about the "pattern of life" the meaning of the concept "pattern" usually disappears--it becomes a synonym of "way of life." To a design-thinker, it is important that this meaning not be forgotten, that it continue to retain a certain content. What is this content? When I deal with an object made by a designer I must simultaneously include myself in life, act together with this object, and live within this objective environment, forgetting about the thing I am using (a good lamp is one which simply provides lighting, and a good pen is one which I forget about while I am writing), and dismiss myself from the tool of action, making note of it: It must catch my eye, it must be perceived as an image, as something apart from me, as something subordinated to the objectives of esthetics. Consequently design is unique (as is the case with architecture) in the fact that it creates objects that are simultaneously tools, a form of vital activity, and its image, an object of apartness, an object of satisfaction.

The combination of these two objectives shows itself very acutely in relationships between production design and interior design. The esthetic problems of production design involve inclusion of the individual into the tense, rabid rhythm of modern life, life within this rhythm, and a sense of comfort within it. But then take a look at where interior design is going: We need to be included into this rabid rhythm, but simultaneously we want to exclude ourselves from it, concentrating upon ourselves: A yearning for the old styles of rococo and baroque arises. Modern man and the modern type of activity require both inclusion and exclusion, a view from the side and concentration upon one's self, thoughtfulness toward former cultures.

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One might ask what sort of design I am talking about. I am talking about production design in its rigid, conflicting association with environmental design, with interior design. It is precisely in the mutual exclusion, the collision (and not hardly some sort of idyllic unity) of all of these "designs," where each type claims universal significance, that we see modern design as a whole. This is the way it must be perceived and loved.

Also in this aspect, I would like to turn our attention to three points concerning designer education which must be considered if the designer is to learn how to bring this internal conflict of design to the view and consciousness of the user. The first point: It is the problem of style, which is the most important to design. It is in the idea of style that design acquires a possibility for communicating with its past. The problem is that as a special form of activity, design arose relatively recently, and consequently we can talk about its past only after making considerable qualifications. But it is precisely in the idea of style that design can recognize past history as its own. In actual fact, what is "design" of the past? In many ways it is "style." Let us look at a typical era such as the Renaissance (especially its beginning) concentrating our attention chiefly not on the finished works of art, for example paintings, sculpture, and so on, but rather on the things which have quite recently been taken out of the sphere of art, furniture for example. Thus we can see different styles replacing one another, characterizing an artistic work and the style of life itself simultaneously. Styles arise which are somewhat spontaneous and whimsical, styles which make themselves known but which do not fuse together with the pattern (way) of life. Specifically, design today is the history of styles making itself known today, reduction of all former styles into a single entity and revelation of that which styles can project. To educate a cultured designer means to educate him through the history of styles refracted through modern times. The history of the arts itself appears to the designer not in its pure form but rather as a history of the styles of life.

The second point: Architecture and design. Architectural synthesis (synthesis of an environment, a home, an interior) has always been a form of synthesis of the arts. It was not until the New Era that the "painting-house" unity could be "dissected" into chunks so that the "canvas" could be placed inside a museum (compare the first variant of Rembrandt's "Night Watchman" with its final form). Prior to the New Era, in Antiquity and in the Middle Ages, a painting was immediately viewed (beforehand even!) as something that was inseparable from a shrine, from a house, from general architecture.

As a synthesis of the arts, architecture is a key to an understanding of modern design, since architectural vision presupposes that we are looking at a building as we approach it, as we enter it, and as we pass by it. We pass by the building, and in our consciousness its architecture evolves as a complex series of architectural patterns interrupted and connected by streets. To the architect, the pattern of life and architecture itself merge into a single unit. The same is true with a designer. This is why

it appears to me that the history of architecture and its integration with modern architecture are extremely important to designer education.

The third point. In the 20th century these trends are applicable to art as well. Modern art is acquiring more and more of a nature of planning activity. After all, we would not be able to understand a modern artist, be he a Picasso or a Broek, if we fail to understand that he is not simply representing that which he sees, but that he is representing in a sense a plan of the thing, the tree, or the human face, which we fill in through our coparticipation. We are coparticipants of the artist. All modern art is structured on the principle of a continually greater demand on our own activity, on the activity of the spectator-coparticipant involving a continually diminishing volume of directly expressed form.

In "Chelovek" (Man), Mayakovskiy encounters the "first" unsuccessful plan of a "whale" in the sky. It is these "unsuccessful" plans, plans which have remained unmaterialized, which cannot even be materialized, that are the plans of our activity; they characterize the thinking of planning as such, and it is precisely within them that the plan of the pattern of life (style of life), architecture, and art merge into one. Moreover, modern engineering is orienting itself more and more toward the planning type of thinking: In contrast to engineering at the end of the 19th century and the first design triumphs of the 1920's, engineers are now basing themselves more and more on the idea that an implement of labor should be not so much convenient to direct manual use by a worker (it should not be noticed) as it should provoke his thought. The form of things (including tools) must be planned such that the thing does not simply facilitate action with it, action embodied within the thing itself, but namely so that it would provoke possible changes in the thing and in activity. The form of the thing must allow the individual to sense the insufficiency of that which is present: An existing plant must be a plan for another, one that is not existence, one that is only a possible plant.

I believe that thinking must proceed in the presence of these tensions (it would then itself be intense and problematic), and it is on the basis of these tensions that designer education should be structured. In any case it should not be structured on the "resolution" of these contradictory definitions.

G. B. Minervin: You have spoken very interestingly about a very important problem, that of the fusion of architecture, fundamental arts, and design into a single complex. But does it not seem to you that as a result the specific features of design disappear?

V. S. Bibler: In my opinion, no. What does a designer plan? In the end he plans a singular designer, he plans the design thinking of the user. Design thinking and design activity are one of the forms of intense, antinomic synthesis of the tensions of 20th century culture. Both architecture and the pattern of life assume their paradoxical and sharpest form today in design activity.

L. I. Novikova: Are we not thus returning to romanticization of design, a phenomenon which we have all suffered through already? Design taking the form of demiurge, responsible for everything?

V. S. Bibler: I was discussing the theory of design, and theory always makes the claim of universality--that is, "romanticization." The "childhood disease" of romanticization will never disappear from human thinking, and we will never be able to suffer through it once and forever. To me, a philosopher working in culture, design is that experimental field in which all contradictions of 20th century culture appear with special acuity-- the struggle between the engineering and artistic approaches, definition of a machine as a resource for the most convenient work with it and as a tool by which to provoke thought, and so on. Design is a modern form of the impossible combination of all of these difficulties. After all of these difficulties are resolved (assuming that this will happen), the contradictions of the century (other contradictions this time) will come together in a different form, not in the form of design. I think of design not as a future utopia but rather as a mortal phenomenon of the 1950's-1980's.

Consequently we are discussing the tormenting contradictions within design itself. If this is romanticization, then it is the most skeptical, the most realistic romanticization of all types possible.

D. N. Shchelkunov: All discussion about design ends as a rule with the question as to what precisely design is, and inasmuch as we cannot provide a conclusive answer to this question, it crowds all other problems to the sidelines. Let me return to the question of artistic design education, in this case from the point of view of a person having to deal with designer personnel provided to us by art schools.

I would like to note a number of shortcomings in the training of these personnel. First, young specialists lack the skills of research. Second, they lack a considerable amount of knowledge, for example in sociology, social psychology, semiotics, and systems technology. They are insufficiently trained in terms of engineering knowledge: Many of them are poor at mechanical drawing, they have no knowledge of production operations and their mechanisms and, after all, production is our basic client. Third, designers do not know how to write; it is difficult for them to present their thoughts clearly. Graduates of the Stroganov school and of art VUZ's, people who are brought in contact with the highest values of art, are sometimes not very intelligent. Fourth, the most important thing not "represented" in graduates is professional thinking, a world outlook. As a result the individual leaves the VUZ with an unformed professional ideology.

Does it make any sense to train a differentiated designer? I am talking about differentiation of a special sort--specialization in terms of synthesis, analysis, and so on. Perhaps some day we will have designer-analysts, designer-coordinators, and designers that are generators of ideas. But I am nor sure that there is any sense in aiming training at the VUZ's at such specialization: After all, we are not training senior engineers, academicians, and so on. All of that depends on the person himself.

What should be the principle for selection of VUZ applicants? I think that the main criterion can and must be presence of a critical approach in general and to the objective world in particular.

We have discussed the inner dissatisfaction experienced by a designer trained at an art VUZ. When we look at the facts, however, we find that an applicant is accepted to an art VUZ on the basis of the criteria of an artist: The applicant is required to bring along a number of his paintings and illustrations. He is taught representative art. As a result he feels himself to be an artist, and not a designer, all the more so because the skills of drawing, sculpture, and color sense which he acquires in the art VUZ are inapplicable to the objects of design, since in design, both color and the plastic nature of materials have their own specific features, different materials are worked, and these materials require specific study.

How do we train a designer? From my point of view a designer is not a synthesis of an engineer and an artist. This concept of design was applicable to the period of its initial development. Today a designer is a special specialist who must be trained not in a technical and not in an art VUZ, but rather in a designer VUZ specifically. I suggest that the time has come to create designer VUZ's specifically.

We are reproaching the system of education. But why? Fundamental concepts and knowledge which would permit us to place this system of education on its own two feet have not been developed as yet within the system of education. Moreover, can they really be developed within this system itself? I think that development of theory is a matter for scientific research institutions. In my opinion the objective of the VNIITE should be to create a theory of design which could serve as the foundation for a correctly organized system of education.

V. N. Plyshevskiy: I would like to begin with the debatable question as to the analogy between design and artistic activity, and not so much with the traditional nature of the question itself as with the fact that it has become fundamental in today's discussion. I agree most of all with Gnedovskiy, and I disagree entirely with Ye. A. Rozenblyum.

The designers Rozenblyum is talking about feel themselves to be slighted by fate because their eyes have not been opened to the true goals of design. They are trained as artists, and they must work as designers. It will always appear to them that they are employed in something other than that for which they were trained. Hence follows the sole possible consolation-- escaping into painting, sculpture, and graphic arts--that is, into those forms in which the results represent chiefly the author of the work.

Why has this come about? The entire problem lies with the obsolescence of our ideas about the nature of a designer's occupation. Ideas which were stated at the moment of the birth of design, ideas which are still half-baked in many ways, dominate in the consciousness of the mass reader of literature on artistic design. I have in mind the popularly held thesis that the only thing that keeps a machine planned by an engineer from being complete is

"beauty." And since "beauty" is one of the categories with which art historians deal, it would be natural to assume that the theoretical bases of design should be sought in art history, and that the artist must be the professional responsible for creating beauty. To date, we still hear people talking about the "union" of the engineer and the artist, the technician and the esthetician, and so on as synonyms of the designer approach (even in professional publications on design). Of course, I am stating the problem rather roughly. But a fact remains a fact: The broad public and even individual practicing designers feel that this is so.

True, there are more-sophisticated grounds, according to which the main thing in design is the expressive aspect of objects. An argument based on these grounds goes as follows: An engineer is not involved with expressive tasks, meaning that they would be within the competency of an artist; the tasks of an engineer are functional. But many have noted that a designer also has functional tasks, for example in the planning of an individual's interaction with the objective resources of his activity. Then the designer becomes both an artist and a sort of "human factors engineer." But it has come to be recognized in the last few years that "human factors engineering" is not design. Dissemination of the ideas behind planning from the standpoint of engineering psychology and ergonomics, independent spheres in which problems are solved by nondesigner resources, has played a major role in this.

With what resources does a designer solve his problems? With compositional and expressive resources according to the general opinion. Does this mean, then, that he is an artist? No. Of course, designers and artists have very much in common in relation to the resources of their activity. But their goals are directly opposite. The goal of an artist is to express his individuality in a creative product. Of course any person can display his individuality in any form of creativity. But to an artist, this is the goal of the activity itself. Even in applied art, the familiar, natural form of things is only a motive for the artist to reveal himself. The user of the article is not misled in this regard either. He knows how to use this thing, and it is familiar to him. But he simultaneously sees how individualistic the author was in interpreting its form. He might even be able to assess the author's character traits (his expansiveness, punctuality, strength or weakness, and so on). Do we need things that "bear the imprint of an artist's hands"? Agreeing with D. V. Gnedovskiy, I would say yes. Contact with such things means contact with the individuality of their author. Contact with works of art is in general that emotional communication with other people which every person needs.

It can be said that the goals of design are opposite. A thing created by a designer is perceived by the user as "his own." Of course this is in part the result of the fact that he makes use of it. But this is not the main point. A designer expresses in a thing something which makes it, in the eyes of the user, even more "his own." This something is a reflection of the user's sociocultural status, his tastes, and even some of his personality orientations. Moreover, this something can be expressed in different ways-- "roughly," "delicately," "tactfully," "point-blank," "moderately," "flatteringly," and so on. The user might recognize the thing to be not only "his

own" but also "beautiful" if these problems are solved expertly. But what happens with the designer's individuality? By the strength of his imagination, a designer suggests "how things could be" (L. I. Novikova talks about this), he creates his own vision of a future situation--that is, he makes a prediction (Ye. A. Rozenblyum talks about this). But this does not yet mean that he is behaving as an artist. A designer views something that is individualistically expressed as something socially and culturally significant-- that is, he treats it as a new law which must enter into human practice. Moreover he must know that he can make this claim namely on the basis of that which he expressed. Yevgeniy Abramovich Rozenblyum is entirely correct in citing "Tatlin's tower" as an example of an attempt at a designer's approach. But he is totally wrong when he says that it was precisely in this that Tatlin revealed himself as an artist.

Let me try to briefly formulate what in my opinion we should focus our attention on. A designer gives the status of something generally meaningful to that which is individualistically expressed. On the other hand an artist imparts the traits of his own individuality to something generally meaningful (for example a well-known object, an abstract diagram, a plot, a theme, and so on).

The thinking of all people in general is based on a mutual dependence between that which is individual and that which is generally meaningful or, to put it more profoundly, between that which is descriptive and that which is categorical. The fact that for creative thinking both of these aspects must be highly developed and mutually dependent is another matter. Both of these aspects are needed, in their unity, by both the designer and the artist. But it would be incorrect to declare on this basis that the designer's and artist's approaches are identical. Thinking alone is not the level at which we can correctly make such conclusions. At the time when thinking is "on the job," we cannot say whose it is--a designer's or an artist's. It all depends on the initial orientation (what is the goal of the activity?) and the way the result is interpreted (it is a work of art or a designer's product). In order to understand the difference between a designer and an artist we must analyze not so much thinking as such as reflection of the specifics of its goals and results within the consciousness of the creator.

The specialization problem is very important. I say "problem" because I see a contradiction here. It has been noted validly in some statements that we do not have a singular design today as yet. Inasmuch as design underwent evolution empirically in many spheres concurrently, spheres which differ considerably in material and objective respects, naturally particular principles took shape in each of these spheres. This is the basis of the argument that there cannot be a single principle of design: There are many of them. Consequently a professional in one form of design cannot solve the problems of another form. But, on the other hand, it is recognized that there is a singular principle characterizing design as an occupation different from, for example, engineering. We have talked about this today. Then

it would be tempting to suggest that a designer having mastery over a single method, a single approach, could plan everything.

I would word the contradiction as follows: It is impossible to know how to plan everything: One must become a specialist with a narrow profile. One cannot become a specialist in some single sphere (supposing it suddenly disappears in the future?): One must master the general designer approach. Ye. A. Rozenblyum suggested a solution to this antinomy which I believe to be successful--two directions in designer specialization. But we have no grounds for stating that we have the predicting artist in the first case and the drawing engineer in the second case. Both are designers in relation to their goals and principles of activity. The first has better mastery over problem solving methods and deals with the basic problems of sociocultural development, evolution of the objective environment, and so on, while the second has better facility with the compositional structure of objective forms of certain types and deals with the general problems of day-to-day culture and the planning of things for a particular sphere. Incidentally, this distinction exists in many areas of activity. In science for example we have the scientist who deals with entire directions and the scientist-experimenter.

It would be convenient to represent this distinction in the designer training system not as directions in which to train specialists but rather as successive stages of training which each student must undergo. In the first stage the student assimilates the general principles of problem solving and the designer approach. In the second stage he assimilates the specific features of the problems designers solve in certain concrete spheres. In the third stages the student works on his diploma project; by himself or with the advice of instructors, he selects the role he will play (a problem analyst or a designer of concrete articles), and he determines the sphere from which he will take the topic of his diploma project (the living environment, personal services, production, and so on). This is the way designer training is structured at the Sverdlovsk Architectural Institute. D. V. Gnedovskiy has talked about this already.

It sometimes happens that an artist solves a design problem, not because he is an artist but in spite of that fact: Because of his own personal interests or because "life dictates that he do so." Incidentally, engineers, especially engineers of the past, have solved complex design problems also, so to speak, in spite of their basic profession. Nevertheless it would be better to turn to a designer in such cases. The fact that the designer occupation itself is not clearly defined today is another matter. For practical purposes, this lack of clarity is not catastrophic: Much is compensated by personal experience. But in the designer training system the consequences of this lack are quite injurious. The eclectic nature of the instructor staff is a natural product of the occupation's novelty. The main difficulty lies with the inertia of the awareness of the instructors themselves. We are finding that it is not all that simple to change an instructor-engineer's or artist's idea about the goal of his subject, and it is even more difficult to change the methods of instruction themselves.

We should recognize that it is better to train designers today in an architectural institute. Many are now in agreement with this. In an architectural VUZ, designers are rescued by the fact that as is the case with architects, they have a special discipline, "Planning," within the framework of which the students acquire the skills of their activity and of using designer language, they assimilate the specific features of the subject and objects of design, and they solve practical problems. Thus despite the inadequacies of instruction of a number of other disciplines, some sort of compensation is received with the "Planning" course.

It is indicative that all instructors teaching designer planning at the Sverdlovsk Architectural Institute have either had practical work experience in the VNIITE system or had remained in this department as young specialists after graduation. Obviously, we can also train specialists to teach other disciplines, in which it is important to bring about an awareness of the specific features of the design approach, on the basis of the "on the job" principle.

Until this moment I have been talking only about the difficulties associated with our understanding of the specific features of the subject and resources of design. But there is another difficulty, which is perhaps even greater-- providing training in the activity itself. Many recognize today that occupational skills cannot be gained from lectures (even ones dealing directly with methodology) or from attempts at independent problem solution, for example when an instructor "farms out" problems to students. Activity can be learned only in its process. And inasmuch as the student had not gained such experience beforehand, "instructor-student" dialog plays the decisive role, but not in the form of consultation in relation to the topic of the student's project but rather in the form of a special dialog organized as coparticipation in development of a designer solution. Incidentally this is the only resource that permits the student to develop professional thinking; in essence it is "internal dialog" based on a dialectical antinomy. In my opinion this is in close agreement with the ideas suggested by V. S. Bibler during this meeting. To instructors teaching designer planning, all of this means a need for mastering entirely new didactics, methodology which is not fully developed anywhere yet. The complexity of solving this problem is one order of magnitude higher than that of everything we have talked about today. I think that L. I. Novikova is correct when she says that this crisis is generally typical of all education in our era. Design meanwhile, which is an occupation that is still undergoing development, is actively absorbing all of the conflicts and problems of our times.

The last question I would like to touch upon is: What sort of design theory is needed by the designer education system? The task of retraining practicing designers is a most thankless one from my point of view, especially when designers do not want to be retrained. The ordinary practicing designer views theory as a resource that must help him (provide a "recipe") in difficulties he himself has come across. If he fails to receive a recipe, nothing else would encourage his interests in theory. Of course I am not referring to designers endowed with a strong reflective consciousness, designers who can critically review their own activity. They are more likely the exception.

How can we explain all of this? The goal of the practicing designer is to provide a certain material-objective result. Theory is "food" for the head, and the practicing designer wants to associate it directly with the results as quickly as possible. This is the source of all the difficulties.

The education system is an entirely different matter. Even the goal here is different--forming a particular sort of consciousness and thinking. It is precisely here that theory is found to be the best practical resource. However, this is a special theory. It must be built following the principle of dialectic evolution. The problem here lies not at all in finding the form in which to write lectures, but rather in finding new conceptual resources with which to develop a theory of the subject of design from scratch, even though we might come up with the same theory we had before. The VNIITE does not see this as one of its tasks. Therefore I cannot agree fully with the opinion, suggested here by D. N. Shchelkunov, that theory development is the task of scientific research institutions. The theory I am talking about must be developed in the VUZ's.

Much has been said about the fact that "the time has come to turn our attention to the instructor," "we must work with instructors." The very form in which this need is stated indicates that this desire is addressed to those who do not teach. Moreover, no one really knows how to work with teachers. To do so, we must first acquaint ourselves with the way the instructor himself works-- that is, with pedagogics as a minimum. What we must do in fact is begin doing the teaching ourselves. If so, then there is no longer a need for "turning our attention to the instructor." We are aware of many colleagues of scientific research institutes who simultaneously conduct research and teach. This is precisely where I think we have a "bridge" between the VUZ's and scientific research institutes. Moreover, this bridge has been erected from two sides--by theoreticians involved in education and by educators involved in theory. To make this tie stronger, we must also afford organizational possibilities. Let me try to formulate them.

First we must submit a number of scientific research topics pertaining to the theoretical problems of designer activity and education for coordination to the State Committee for Science and Technology, topics for which the VUZ's and the VNIITE would serve as coexecutors.

Second, we must develop an exchange program in which scientists would be sent to VUZ's and instructors would be sent to scientific research institutes.

Third, the VNIITE should plan a budget intended specifically for contracts with VUZ's pertaining to theoretical problems of special importance to designer training, so that VUZ instructors could conduct research on the basis of business contracts.

O. V. Sokhadze: I would like to dwell on some opinions stated here reflecting the contradictory premises of both practice and the theory of designer education.

Ye. A. Rozenblyum suggests training designers at an art VUZ.

D. V. Gnedovskiy suggests training designers in an architectural VUZ.

L. I. Novikova suggests training designers in "scientific-production-educational complexes."

In regard to the first suggestion, I fully agree with G. B. Minervin that there is no such thing as two designs, similarly as there is no such thing as two architectures. I would just like to recall that it was not so long ago that our VUZ's were graduating artist-architects and engineer-architects. Practice has demonstrated the error of such division. Today the system of architectural education trains architects of a broad profile, and this is doubtlessly the correct path which designer education will follow.

Nor can I agree with D. V. Gnedovskiy's assertion. The successes achieved at the Sverdlovsk Architectural Institute, which trains designers, must be explained by the fact that the institute's developed material-technical base affords better possibilities for the training of designers in this large architectural VUZ, and that a possibility is afforded for providing integrated training programs in parallel with architectural training. However, even these advantages fail to solve the problem, since a certain apartness still remains. What we have is the same old design department within the structure of another VUZ. This is precisely the principle followed in organization of our country's entire system of designer education.

I can boldly assert that the artistic design departments and schools contained within a VUZ specializing in something else cannot satisfy today's requirements on designer education, neither in relation to their organizational and functional structure nor in relation to their material-technical base. If we are to raise the basic components out of which these principles of education are structured to the necessary level, we would have to conduct reorganization so fundamental that it would transform the design department into an independent VUZ.

But even an independent higher school possessing an extensive material-technical base, containing the necessary departments, and offering properly organized training, scientific, and production cycles, is capable of satisfying the requirements of higher professional designer education only at today's level, whereas we in the higher school are required to plan the immediate needs of practice and predict the longer-range perspectives.

What are these perspectives? The requirements on occupations having to do with objects and space, to include design, are changing before our eyes. The basic, determining essence of these requirements lies in the need for organizing the objective-spatial environment, such that architecture organizes the space in which the individual performs his social activity--the social space, design and applied art organize the objective world within this social space, and descriptive art organizes the artistic idea within the social space.

The task of creating such an organized environment, which would have the nature of a system, dictates implementation of a single program (a cultural policy) based on the country's socioeconomic level of development; such a program would be implemented through coordinated control over art, science, and education. Such a socialistic approach would unite the environment-forming processes, the science of the environment, and the training of organizers of the environment into a single whole, one expressing the super-structure above the social foundation essentially through resources of different types.

Hence follows the need for creating a scientific-training complex directed at organizing the environment.

It should be noted here that creation of training-scientific-production complexes is the dominant trend in the theory of domestic VUZ's. This is the position taken by L. I. Novikova.

However, it appears to me that it would be insufficient to discuss creation of such complexes on the basis of scientific research and planning activity, since the educational processes must go on not on the basis of but in cooperation with scientific research and planning institutes. Moreover, in my opinion, we could hardly say that in these complexes, "that which is impossible for a practicing designer, who must complete a certain assignment, would be possible at the level of artistic design shops, in which projects would be worked on with a certain amount of freedom from social, economic, and other necessities" (L. I. Novikova). Educational science is revealing a different concept: The scientific research and practical activity of the student precisely in association with the society's socioeconomic tasks is becoming a necessary component in the formation of both the student's thinking and his world outlook.

In my opinion a designer with a comprehensive background could be trained only at an independent design school cooperating with an architectural VUZ and a VUZ specializing in descriptive and applied art within a developed, multiple-profile complex composing a single organism together with centralized services. A large scientific research institute on organization of the objective and spatial environment, an institute dealing with both the practical problems of environment formation and development of new principles, systems, and methods of education, could become the coordinating center of such a complex.

Its organization would be based on two fundamental principles—on one hand, differentiation of the complex into individual departments and, on the other hand, their unification in accordance with the functional-procedural characteristics. This would allow each department, existing as a large organizational component, to develop flexibly in the direction of possible integration with other scientific subdivisions. Organizational flexibility would be promoted by the principles of flexible planning, the application of which is recommended by the most progressive solutions we have seen in the planning of VUZ's and their complexes.

Scientific-training complexes dealing with the environment have numerous advantages:

1) Social--a new organizational structure concentrating the educational, creative, and scientific potentials of the institute would have a doubtless socioeconomic impact;

2) educational--redundancy of disciplines is excluded, as a result of which training cycles related to associated disciplines would be provided with a more-professional foundation in other VUZ's of the complex; the material-technical base of all institutes would be put to use; a possibility would be created for conducting integrated programs and creating intra-VUZ departments; the student would become involved in the real processes of scientific research and planning activity; scientists and practical workers would be encouraged to engage in educational activities, and so on.

3) Scientific and creative--enlargement of the VUZ system would afford a possibility for creating, out of different scientific research and planning organizations, unified interdepartmental associations to solve concrete problems; the complex's extensive experimental-production base could be used in their activities; a possibility would be created for making use of student and instructor research potential.

Ye. A. Rozenblyum: I would like to offer a rebuttal to those who assert that there is no such thing as two designs and there is no such thing as two architectures. In the least, this assertion is inaccurate. We could properly say that there should not be two: That is a matter of the given speaker's own convictions. But it is a fact that this duality does exist today. It is a fact of both domestic and foreign practice, it is a fact of the system of education, one which is either confirmed officially, in the West for example as a need for different programs in which to train different designers, or one which evolves empirically, as in our country, where although a unified program does formally exist, the composition of the instructors and the training environment predetermine different types of training.

In my opinion the need for different types of designer training stems also from the universally recognized principle according to which designer activity is collective. Collective labor has meaning only when the collective is made up of different specialists who enrich and supplement one another. Not only dialog but also that conflict of objectives and occupational orientations, planning, and creation which V. S. Bibler had discussed so brilliantly are possible and necessary within collective creativity.

The need for different types of training also corresponds to the desire we have heard so many times for organization of training-production complexes. The history of the development of design at the time of its greatest achievements was essentially the history of training-scientific-production complexes. The VKhUTEMAS [Higher State Art and Craft Shops], the Bauhaus, Ulm and, if

we were permitted to list it among such distinguished neighbors, our Senezh are all training-production associations. These are designer schools in the educational, scientific research, planning, and experimental meanings of this term. Their value lies in their differences. The more designer schools there are and the more diverse their activity is, the richer and the more all-encompassing our design would be, the stronger its influence on production would be, the more fully it would reflect upon the way of life of people in our society, and the more actively it would participate in formation of a socialist material culture.

Discussing the training system of the Mukhinskiy and Stroganov schools, V. A. Pakhomov and G. B. Minervin listed a continually growing number of cycles of different disciplines, as if enlargement of their number would improve designer training. Unfortunately, the problem is not this simple. The time allocated for training is not changing, and new disciplines could be introduced only at the expense of existing ones, which often leads not to an improvement but a deterioration of training. When distributing a certain number of hours among particular subjects, we must obviously remember that certain abilities and knowledge can be acquired after graduating from the VUZ--in the process of occupational activity, and that there are certain abilities which can be acquired only at a VUZ. Such abilities must be provided by a cycle of art disciplines specifically. This cycle cannot be reduced; it must promote professionalism and freedom of creativity in the designer. Accumulation of a wealth of resources for expression must be one of the important aspects of training, not only in drawing, painting, sculpture, and composition lessons, but also in the process of acquiring planning skills.

We cannot have some sort of averaged language specific to planning, since such a language would place constraints on plans, neutralizing their meaning and diversity.

The students must know how to find a special expression for each planning idea, an expression applicable only to it, without which the idea could not exist. Only mastery of this sort of planning language would promote attainment of the necessary professional level by a graduate of a designer school.

S. O. Khan-Magomedov: I also feel that we cannot solve the problem of artistic design education without clarifying the specific features of the designer's education itself and the role of this specialist in the general process of formation of the objective environment in which man exists.

I am convinced that in relation to the nature of his activity, the designer is in many ways close to the architect.

Development of science and technology in the last 50 years has led to a situation in which all sectors are experiencing rapidly proceeding specialization, differentiation of the areas of activity. Planning and construction are becoming increasingly more complex, and the functional processes for

which structures are erected are becoming complex and more highly differen-
tiated; new specialists of increasingly greater numbers are beginning to
join the architect, and as in the distant past, the architect continues to
be the universal specialist. What is the reason for this mysterious stability
and indivisibility of this ancient profession? Obviously if the basic goals
and objectives of his profession are staying the same, the architect must
be playing some sort of special role in this dynamic system which is be-
coming increasingly more complex. What is this role? It appears to me that
the architect is a representative of human interests in construction; his
role is to insure satisfaction of the utilitarian and esthetic needs of the
individual.

As a profession, design is the result of technological development. In
traditional applied art, the expert craftsman was a narrow specialist. He
was responsible for everything--for the processes to be employed, for crea-
tion of the model, and for reproduction of his object. Such a craftsman
had to be a narrow specialist. Technology has gradually taken over much
of what the craftsman used to do. The former artisan became the designer--
that is, a specialist creating the functional-artistic form of an article
manufactured with a machine. What has occurred in design during the last
half of a century might appear incomprehensible at first glance: The
narrowly specialized, separate artisan occupations have been replaced by
the universal occupation of the designer.

In relation to the types of his work, the designer is exactly like an archi-
tect--that is, a specialist representing human interests in a world of
technology, from the standpoint of that area associated with creation of
the objective environment.

It stands to reason that specialization is needed in both architecture and
design (in work and even in certain stages of education). But that is not
the point. The point is that in principle, these two professions are uni-
versal, as is the goal which gives the reason for existence of these pro-
fessions. These professions exist in a sense "in another department":
The growing complexity of our technology, which is causing the arisal of
new, narrow specialists, is not affecting the basic objectives of architecture
and design; it is simply providing new resources and possibilities to them
for solving the same old problems--satisfying the utilitarian and esthetic
needs of the individual.

I would like to turn my attention to one more problem. For some reason
today's works on artistic design are tending more and more toward discussion
of functional-technological problems, shamefully giving the artistic problems
of form formation a secondary place. Many articles make us think that the
artistic form of an article depends wholly on function, construction, mater-
ials, and the production process. If so, then do we really need a specialist
such as a designer? And why is is, then, that the designer profession did
not arise out of the engineering profession, and that the first designers
were artists and architects?

The history itself of the arisal and formation of the designer profession goes a long way in helping us understand the specific features of this profession. Recently, historians of Soviet art have been displaying increasing interest toward the processes behind formation of the design profession in our country. However, the main attention is devoted as a rule to analyzing the works written by theoreticians of industrial art; meanwhile, the works of artists-producers are often cited only to illustrate certain premises of the theory of industrial art. And yet we would not be able to understand the process behind formation of design without carefully analyzing the activities of those artists who switched from painting to industrial art in the 1920's in a process of creative enquiry. Understatement of the role of artists in formation of this new form of art is associated with understatement of the artistic features of the designer's creativity. Without knowing the role of artists in the process behind formation of the design profession, it would be difficult to fully understand why a specialist such as a designer is needed at all in the system of industrial production. Why, specifically, can we not explain the artistic procedures of form formation simply to a process engineer by including a number of artistic disciplines into the system of instruction at technical VUZ's? Could it be that this would be better than training designers, who in every concrete area of industrial production are in some way inferior to engineers who know the production process in all of its fine points?

The entire problem lies with the fact that an engineer cannot replace a designer (or an architect) in problems pertaining to form formation. A process of form formation in which form is always a derivative of the function, construction, and production process of an article is typical of an engineer's method of work. Were it true that the method of thinking used by a designer differs from the method of thinking used by an engineer only in the esthetic hue in their approach to form, then there would in fact be little sense in existence of the special profession of a designer. Engineers and designers differ not only in relation to their esthetic training but also in relation to differences in the thinking process itself. Moreover, this is manifested chiefly in problems pertaining to form formation.

The independence and productivity of the designer's role in industrial production depends, not in the least, on the fact that to the designer, artistic form is not only the end result of a sensible solution to functional-technical problems, but it is simultaneously also the motive for creativity. The designer not only harmonizes the form he obtains, moving in his creative process from function to form, but he also influences the function of the individual through form. This is precisely how the method of his work differs from an engineer's method. While in his creativity the engineer proceeds only from function to form, in the creative method of the designer the reverse course of thinking--from form to function--plays an important role in addition to this. More precisely, both of these methods of thinking-- from function to form and from form to function--merge into a single creative method in the work of a designer. This specifically is what makes the work of a designer unique; this is what makes him a necessary specialist in the overall process of producing industrial articles.

Without recognizing the active role of artistic form in the process of form formation, we cannot explain, for example, the processes behind formation of style and fashions, and we cannot understand the laws governing development of the creative conceptions of a trend, a direction, or a particular craftsman, the procedures for creating a unique style in modern design, and so on.

Feedback between form and function is specific namely to artistic creativity. This is why the designer's profession could not have arisen by itself, without the active participation of artists, the method of thinking of whom in relation to the problems of form formation differs significantly from the engineer's method.

This is why artists have played such a great role in the formative stage of design; in the course of a complex process of formal esthetic inquiry and experiments with abstract form, these artists went from representation of reality to formation of an objective environment, laying the foundation of the creative method of modern design chiefly in relation to the artistic problems of form formation.

L. A. Zhadova: I would like to just let my imagination run free at this "round table" concerning creation of a special architectural-design or, on the other hand, design-architectural training institution. It might have the following departments--architecture, design, engineering, construction engineering, and culture theory and history, outfitted with offices and laboratories for scientific research and experiments. For a certain amount of time, during the first 2 years for example, students in all departments would study general artistic-creative and production disciplines--an introductory course in composition, and introductions to architecture, design, engineering, construction, and culture history. At this time, on one hand the students would reveal their individual interests and capabilities, while on the other hand all students would receive general preparation; they would learn to speak in a language, common to all of them, which would permit them to understand one another in the future, after they acquire different specialties. In such a special design-architectural VUZ, it would be very important to foresee those methods and resources of work with students which would help reveal individual creative capabilities. One of the greatest shortcomings of education today is that it ignores recognition and self-recognition of human individuals, that it fails to clearly define their greatest predisposition toward work in one direction or another. It might be good to develop a course of special lessons which would help to reveal the unique "extra element" of each student (I am using an expression suggested by K. S. Malevich, who made it the goal of his art school to find this "extra element" in every student). We must seek within the individual that quality which would permit him to add something fundamentally new to the sphere of activity he selects--that is, reveal his creative ego. I believe that the experience of Malevich's school would be useful in this regard. As a result of such lessons we might reveal who has the greatest capabilities in artistic design planning, who has the greatest capacity for architecture, and who is most suited to the inventive work of an engineer. After this, the students would enroll in special departments with greater confidence.

But even in these special departments, students who had studied together for a certain time and who continue to study side by side would preserve their mutual ties, including complex ties that might on occasion be antinomic.

I think that speakers here have validly asserted that design is a collective occupation. This is precisely why, in my opinion, there cannot be some sort of single, ideal model of a designer, in the same way that it is very difficult to create some sort of single, rigid, and unchanging system of training. The training system must necessarily be polyvalent, even if it is to be implemented in that ideal design-architectural VUZ I have permitted myself to imagine. It is precisely in such a VUZ that the designer's occupation would take shape as a collective occupation. In this sense, I think, design-architectural education is closest to modern film-making. Actors, stage managers, operators, engineers, economists, and film production organizers all study together at our All-Union State Institute of Cinematography.

The design-architectural institute could become one of those training-production complexes which we have already discussed here. It is precisely in such a training institution that the links could be brought together into a single chain--artistic experiments and scientific research aimed at the future, the training process associated with an entirely specific, tested, and objectivized system of knowledge, and practical work--participation in real planning and production activity.

I would like to recall the VKhUTEMAS, or the VKhUTEIN [Higher State Art and Craft Institute] because, after all, it was essentially the first training-production complex, which arose in response to an order from the society, having been born in the course of revolutionary alteration of the nature of labor processes.

History has developed such that the value of the VKhUTEMAS's legacy is measured chiefly on the basis of its visions of the future, its ideas, and not its specific works. The governing board of the VKhUTEMAS always tried to establish close ties with the country's economic organs. As early as in the first year of VKhUTEMAS's existence, the architectural department, for example, organized a planning office concentrating on ties with practice, on ties between training and life; according to the plan, the work of this office was to be economically supported by clients.

When in the late 1920's construction assumed a swift pace in the country in connection with adoption of the First Five-Year Plan, this VUZ's participation in such construction immediately became more realistic. It would be interesting to recall the experience of one of the prominent creators of the Basic Course at the VKhUTEMAS, architect N. Ladovskiy: Together with his students at the VKhUTEIN, in 1929 Ladovskiy planned Avtostroy (the future motor vehicle plant in Gor'kiy). It was during the time of this work that he first pondered the place of the school of architecture in the organizational structure of planning, and he suggested that students be assigned the

first rough stage of the work and planning organizations be assigned the second, deeper, technical part.*

Perhaps the integrated design-architectural institute I am imagining could be tied in with the activities of our planning organizations which, in turn, on the basis of such training complexes, would acquire a possibility for scientific research and experimental creative work.

The VKhUTEMAS arose spontaneously namely as a training-production complex, and now we must create such a complex in accordance with a plan, consciously, taking account of all past experience so that we could create a system of designer education that would have an eye on the future--that is, one which would be capable of development.

V. P. Zinchenko: Our "round-table" discussion has centered about two questions:

What is the countenance of the designer's occupation, what sort of model of the designer could be placed at the basis of artistic design education?

What sort of VUZ should train designers?

Avoiding repetition of what has already been said, I will note the following: Existing as activity of a special sort, the activity of the designer is based on synthesis of material-artistic culture; this is the root of the internal, unavoidable conflicts within design; this is the root of its attraction at times to purely artistic forms and at other times to purely technical forms. However, the objective of the designer is to arrest himself at the boundary between esthetic and technical activity without falling into one or the other. Today's discussion has brought to light the fundamental problems of design in a new turn of the spiral of cultural development, in the turn of the 1970's, and it has revealed some new possibilities for their examination. I think that the reader will evaluate these new possibilities.

I believe that the time has come to create a special designer VUZ--not an art VUZ, not an architectural VUZ, and not a technical VUZ. But difficulties obviously lie in the fact that we have still been unable to define the principles that could be placed at the foundation of the training process and a designer VUZ specifically. I would like to express one idea in this regard: In recent times design activity has been defined more and more often as artistic planning, but at the same time the problem of artistic planning as such and its unique features, making it different from all forms of planning activity which had been in existence prior to design, has not been worked on at all adequately. However, it is precisely this idea of artistic planning that might be placed at the foundation of a designer VUZ; I mean planning as it is almost literally defined by the word's Latin root--"projectus"--

*Ladovskiy, N., "Planning of Avtostroy and Magnitogorsk at the VUZ," SOVET-SKAYA ARKHITEKTURA, No 1-2, 1931, p 21.

cast forward, extraordinary, excessive, postponed, delayed. The question of planning as such was raised at our "round table," and new, interesting solutions were suggested for it. But discussion of this problem must be continued, and it must be continued mainly from the aspect of the possibilities of the designer's professional education.

I hope that the reader will be interested in continuing the discussion which has been started here in TEKHNICHESKAYA ESTETIKA.

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IMMUNOLOGY

SUBTYPICAL CHARACTERISTICS OF SURFACE ANTIGEN OF HEPATITIS IN VARIOUS
PARTS OF THE USSR

[Article by S. A. Grannikova, Ye. V. Rusakova, P. Z. Budnitskaya, V. M.
Koroleva, T. M. Lozinskaya and V. I. Vasil'yeva, Institute of Epidemiology
and Microbiology imeni Gamaleya, USSR Academy of Medical Sciences, Moscow,
submitted 25 Nov 76]

[Text] Hepatitis B surface antigen (HB_SAg) is immunologically heterogeneous.
The heterogeneity of HB_SAg was first demonstrated by Levene and Blumberg in
1969 [9] and later, by several other researchers [2-4, 8]. It was established
that the antigen has one group-specific determinant a and at least two sub-
typical allele determinants in the system of d/y and w/r. These subspeci-
ficities are a phenotypic expression of the different genotypes of hepatitis
B virus. At the present time, four different phenotypes of hepatitis B anti-
gen have been identified, and they have been designated as HB_SAg/ayw,
HB_SAg/adw, HB_SAg/ayr and HB_SAg/adr, in accordance with the classification of
the WHO Committee of Experts [1]. As a result of epidemiological studies
conducted in various countries, the distinctions have been demonstrated of
geographic distribution of subtypes of HB_SAg. Subtype ad is inherent in
Canada, the United States, northern Europe, while subtype ay is distributed
in the geographic zone that includes most of Africa, the near and middle East,
southeastern Europe; subtype w prevails in North and Central America,
northern Europe, Austrlia, the near and middle East, Africa, Pakistan and
New Zealand; subtype r is found mainly in southeastern Asia, the Far East
and southern Japan [5-7, 10-11]. The distribution of HB_SAg subtypes has not
been investigated in the USSR; we know only of the work of I. F. Barinskiy
et al. [12].

Subtype analysis of HB_SAg is important, not only for complete identification
of its properties and investigation of geographic distribution of subtypes
in different countries, but for the manufacture of immunodiagnosticum in
order to demonstrate more effectively antigen in human blood serum, as well
as develop products for specific prevention of viral hepatitis B.

It was difficult to investigate the geographic distribution of HB_SAg subtypes
because of the absence of Soviet subtyping antisera. The objective of this

work was to prepare components for a test system to identify antigen sub-
types and type sera containing HB_SAg from different parts of the USSR.

In 1975, in collaboration with the staff of the Institute of Virology imeni
Ivanovskiy, USSR Academy of Medical Sciences [AMS], obtained type-specific
monosera to the two main determinants of hepatitis B antigen, HB_SAg/ay and
HB_SAg/ad. Antisera (anti-y and anti-d) were obtained by immunizing guinea
pigs with donor blood sera, one of which contained subtype ay of HB_SAg and
the other, subtype ad. We typed the antigen used to immunize the animals
and the corresponding antisera using the test system obtained from Prof
LeBouvier.

The first immunization cycle consisted of two injections of HB_SAg with and
without Freund adjuvant. Antigen with adjuvant was injected into the lymph
nodes, and again after 25-30 days intravenously and intramuscularly. On
the 7th day after the second injection of antigen, we tested blood from the
heart of the guinea pigs for demonstration of antibodies of HB_SAg, after
which the animals were completely exsanguinated. The antisera were depleted
with dry donor plasma to remove antibodies to normal human serum proteins.
We then performed adsorption with various amounts of heterotypical antigen
in order to remove the antibodies to the common determinant a. The obtained
antisera contained antibodies to one of the type-specific determinants,
y or d.

To screen sera for HB_SAg, we used the method of incident [counter] immuno-
electrophoresis with 1% Difco agar on sodium acetate and barbital buffer,
pH 8.1-8.4, after which we identified the antigen in a test system by the
method of double immunodiffusion in gel on 1% Difco agar prepared with saline,
pH 7.2. Commercial immunodiagnosticum produced by the Institute imeni
Gamaleya, USSR AMS, was used as the test system.

We typed the sera containing HB_SAg by the method of double immunodiffusion
in gel, using various gels: 0.8% Difco agar, 1% agarose in saline, pH 7.2,
and 0.5% agaros in tris-buffer, pH 8.05, prepared with 0.1 NaCl. The precipi-
tation reaction was run in a moist chamber at room temperature or 30-37°C
for 24-72 h. Before recording the reaction results, the plates with gel were
placed in 10% sodium chloride solution for 1 h. Each serum with HBsAG was
tested with two test systems for demonstration of subtypes ay or ad.

In all, we typed 1400 samples of blood serum containing HB_SAg obtained from
Estonia, Lithuania, Moldavia, the Ukraine, central, northern and southern
regions of European USSR, the Urals, Central Asia (Turkmenia, Uzbekistan,
Tadzhikistan, Kirgizia), Kazakhstan, eastern and western Siberia, and the
Far East.

Serum with HB_SAg was obtained primarily from blood donors, as well as patients
suffering from acute and chronic hepatitis B. Some of the serum was obtained
from healthy people and patients suffering from diverse pathology unrelated
to liver involvement.

The data we obtained in our study of the distribution of HB_sAg subtypes among blood donors indicate that subtype ay is widespread among the inhabitants of all regions (ranging from 77.7±1.5 to 100±1.3%); however, the highest indices were obtained among donors in western and northern Siberia (96±3.9%) and Central Asia (100±1.3%). Suptype ad was demonstrated primarily among individuals living in European USSR (22.0±1.5%; see Figure). An analogous distribution of antigen subtypes was found when we typed serum containing HB_sAg obtained from patients with acute and chronic hepatitis B. Subtype ay was demonstrated in 77.5±2.4-100±1.3% of those tested, and maximum incidence of subtype ad constituted 22.5±2.4% (Table 1).
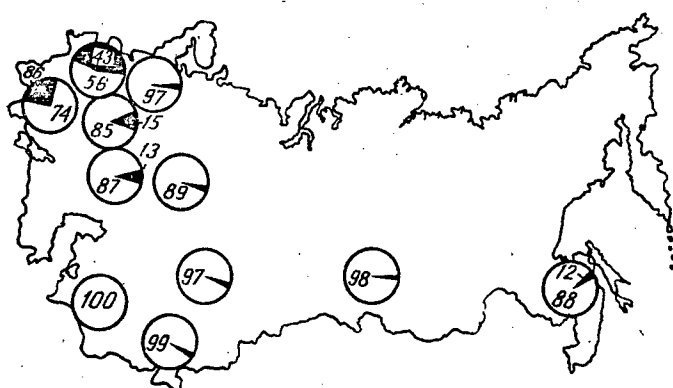
Distribution of subtypes of HB_sAg in the USSR (%). White part-- subtype ay; dark, ad.

Table 1. Incidence of HB_sAg subtypes among blood donors and patients with hepatitis B

Group examined	Region	Sera with HB_sAg	HBsAg subtype					
			ay			ad		
			abs.	%	±m	abs.	%	±m
Blood donors	European USSR	748	583	77,7	1,4	165	22,0	1,4
	Urals	25	22	88,8	6,0	3	11,2	6,0
	Western and southern Siberia	25	24	96,0	3,9	1	4	3,9
	Central Asia	56	56	100,0	1,3	—	—	
	Far East	107	95	88,8	2,9	12	11,2	3,0
	totals	961	780	81,2	1,3	181	18,8	1,3
Patients with viral hepatitis B	European USSR	289	224	77,5	2,4	65	22,5	2,4
	Central Asia	52	52	100,0	1,38	—	—	
	Kazakhstan	34	33	97,0	2,9	1	3	
	Far East	28	25	89,3	5,8	3	10,7	5,8
	totals	403	334	82,8	1,9	69	17,1	2,1

The largest amount of serum containing HB$_S$Ag was obtained from individuals living in European USSR (977 sera). Typing thereof also revealed nonuniform distribution of subtypes ay and ad (Table 2). Subtype ad antigen was more often demonstrated in blood donors in the Baltic region and Moldavia (43.4±6.8 and 24.3±7.5%, respectively); in the central regions it was found in 13.5±1.5% of those tested and no antigen of this subtype could be demonstrated in northern and southern areas.

Table 2. Incidence of different HB$_S$Ag subtypes in the European part of the USSR among blood donors and patients with viral hepatitis B

| Group examined | Region | Sera with HB$_S$Ag | HB$_S$Ag subtype | | | | | |
| | | | ay | | | ad | | |
			abs.	%	±m	abs.	%	±m
Blood donors	Baltic	53	30	56,6	6,8	23	43,4	6,8
	Moldavia	33	26	75,7	7,5	7	24,3	7,5
	Central & eastern	554	479	86,5	1,5	75	13,5	1,5
	Northern	37	37	100,0	1,6	—		
	Southern	11	11	100,0	3,0	—		
	totals	688	583	84,6	1,5	105	15,4	3,6
Patients with viral hepatitis B	Baltic	66	45	68,2	5,4	21	31,8	5,4
	Moldavia	69	50	72,4	5,0	19	27,6	5,0
	Central & Eastern	154	129	84,0	2,8	25	16	2,8
	totals	289	224	77,5	2,4	65	22,5	5,1

Examination of serum from patients with acute and chronic viral hepatitis B in the European part of the USSR also revealed the same incidence of subtypes of HB$_S$Ag. Thus, in the Baltic republics, subtype ay was found in 68.2±5.4% of the patients, and subtype ad in 31.8±5.4%; in Moldavia, the figures were 72.4±5.0 and 27.6±5.0, respectively. In the central and eastern parts of European USSR, subtype ay was demonstrated in 84±2.8% of the sera with HB$_S$Ag and ad, in 16±2.8%. We were unable to type some of the sera. In a study of a sampling of sera containing subtypes ay and ad antigen for demonstration of specificities w or r, we failed to demonstrate subdeterminant r.

We consider our results to be preliminary, in view of the enormous territory of the country and the difficulty of obtaining a sufficient amount of serum containing hepatitis B surface antigen, particularly from remote areas. Unfortunately, we were unable to test serum from the small ethnic groups of the Extreme North, Siberia and Far East, which would probably be of great interest. However, our analysis of HB$_S$Ag subtypes revealed that there was prevalence of subtype ay throughout the territory surveyed, both among blood donors and

patients with viral hepatitis B. As for subtype ad, it was demonstrated most often among the residents of western parts of the USSR.

Conclusions

1. Antisera were obtained to two determinants of hepatitis B surface antigen, anti-HB$_S$Ag/ay and anti-HB$_S$Ag/ad, and a test system was prepared.

2. The results of our study of the distribution of HB$_S$Ag subtypes among blood donors and patients with acute and chronic hepatitis B showed that subtype ay is of predominant significance; it was encountered in a mean of 8.2% of the sera with HB$_S$Ag from blood donors and 82.8%, from patients with hepatitis B. Subtype ad was demonstrated in a mean of 18.8% of the blood donors and 17.1% of the patients with hepatitis B; it was more often found among the residents of western regions of European USSR, in 24.3 to 43.4% of the cases.

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PSYCHOLOGY

FLIGHT CONTROL AUTOMATION

[Article by V. Kalmykov, pilot first class: "With Automation and Without It"]

[Text] The article by Professor Yu. Dobrolenskiy and V. Ponomarenko, doctor of medical sciences, "The Image Representation of Flight," published in the journal, AVIATSIYA I KOSMONOAVTIKA, No 4, 1976, aroused great interest and varied opinions among flight crews. I should also like to express my opinion, for the principles of piloting airplanes and training flyers for all are identical, and the problem itself is of interest to a broad range of aviators.

In my conception, the image representation of flight is the result of the work of the brain, the memory and the imagining of the airplane's position in space. Consequently, it consists of the acquired mental skills of mediated and dynamic orientation, the product of the pilot's long training. The imprinted individual details of the image of flight may be preserved in the memory for a very long time, and sometimes all one's life. Some of them, on the contrary, are erased with time or disappear during a certain period.

In the process of flying a plane, the pilot as a rule creates a visual image. While making the flight, he compares the remembered assigned (necessary) position of the plane with the actual one. This is therefore not difficult in visual flight, in accordance with the natural horizon and the earth's surface visible to him, but it is more complex when flying by instrument. For example, if in level flight the plane has banked or, for external reasons, has begun to gain altitude, the pilot, on the basis of the information perceived, without stopping to ponder, moves the control stick in the proper direction and just enough to maintain level flight. The more and the longer the pilot flies, the more clearly the flight image is impressed in his memory and the less time he needs to determine the plane's position in space according to the information from the instruments. Herein, obviously, lies the basic difference between the experienced pilot and the inexperienced one.

How, then, is the flight image formed? I shall not discuss the theoretical
and ground preparation, including the training, even though the image, it
would seem, begins from the earth. From the first demonstration flights
with the instructor, the pilot records in his memory, with the aid of the
visual analyzer, the position of the plane in space. From the visible
surface of the earth, the sky and the natural horizon he compares the
position of the indicators on the instruments and the plane in space, gains
assuredness of the correctness of their readings and works out the movement
for the control of the plane. As his experience accumulates, the pilot
perceives and records in his memory the characteristic noises of the air
flow around the plane, the vibrations of the propulsion unit under different
flight conditions, the load factor, etc.

An experienced pilot has developed his own image of flight, has worked out
skills to control the plane and read the instrument information only in the
form inherent to him. He controls the plane by instrument with precise and
coordinated movements, spending a minimum of time in reading the information,
and is thus less fatigued in flight.

In order for the flight image to be vivid in his consciousness, the pilot
must be constantly trained. Long breaks in flying work result in the dimming
of the image that has been created and a loss of the habits acquired. If the
pilot uses only one system for the landing approach for a long time, the
special features of piloting the plane according to a different system are
erased from his memory. This is confirmed by practical experience. Obviously,
therefore, after a long break, the pilot is given freight runs with an
instructor to reestablish the flight image, and the habits of working with
the cockpit equipment that have been lost, and in determining the distance
to the ground on landing.

How do I conceive the visual image? Which of the pilots would ponder over
the geometrical image of his winged machine in flight? Probably none of
them, even though each one at the preflight inspection of the plane admires
its perfected form and dimensions. But now the flight is ended. The pilot
taxis in to its stop and in his memory arise the geometrical shapes of the
plane in the form of a visual image. He clearly imagines whether the plane
will pass between certain specific obstacles or not, even though he cannot
see its contour from the cockpit.

Further, each flight is preceded by preparation, ending with a dry run with
the decisive formation of the navigational image of the flight. If the
flight route is not long, with one to three breaks, the pilot or the
navigator is able to remember the magnetic course, the length and time of
the flight at each segment of the route. Here I agree with the authors of
the article, "The Image Representation of Flight." Flying toward the
control check point, the pilot (navigator) can see the line of the course on
an imagined map to the next point, that is visually imagines the entire run
from the point of departure to the terminal point. If, however, the route
of the flight of, let us assume, a bomber, transport plane or civil aviation

plane is thousands of kilometers with many control check points, with different magnetic courses and distances between them, then, no matter how well the crew prepares for the flight, the pilot (navigator) does not remember the course and during the flight will be forced to turn to the map and the flight plan. It is a different matter if the crew flies dozens of times along the same route, for then many details are remembered and the nonvisible image of the navigational component turns into a visible one.

Under certain conditions the navigational image may disappear, and in this I fully agree with Lieutenant Colonel E. Moskalenko and Lieutenant Colonel V. Tsuvarev and Major V. Ivanov. There are times when, as they say, there is just no image. Apparently, this happens more often with fighter planes. The air combat is over. How does one get back to his airfield? This problem arises in the navigational respect, but in the piloting one--the pilot should, in my opinion, always imagine the actual position in space, be it a visual flight or an instrument flight. If not, the pilot will not be able to guide the plane under the necessary conditions.

In an instrument flight, the main and difficult factor, it would appear, is not the piloting technique, but the spatial orientation. The pilot not only orients himself according to the instruments in space, but at the same time detects a tendency to change in the plane's motion.

With which indication is it best to fly? Obviously, with the one that is free of error and in the minimal time makes it possible to determine the position of the plane in space and a change in this position at a given moment.

One of the complex elements of flight for planes of all types is the approach and landing. At this concluding stage of the flight the pilot works with strict rhythm. He has almost no time to create a visual image. In making the approach and landing, he compares the assigned position of the aircraft with the actual one, at the same time controlling it on the basis of the recommendations and actual conditions. The confirmation of this is the laconic order of the flight controller to make the landing approach according to a certain specific pattern.

How does the introduction of an SAU [automatic control system] on planes affect the pilot? The directing system has increased the precision of the plane's being guided to the runway alignment with quite a low weather minimum, without increasing the pilot's physiological tension. The automatic system has relieved the pilot of controlling the plane and has given him the necessary time reserve to compare the plane's actual position with the one assigned by the instruments of the speed, the course, the NKP (PSP) [point operating relay], the altimeter, the vertical speed indicator and the gyro horizon. The pilot may take in all the information on the flight. The transition to visual flight at the altitude for making a decision under complex meteorological conditions is facilitated.

The directory regime, however, has resulted in mechanical control of the plane. The pilot deflects the control surfaces toward the control indicators and "drives them in" to the center. He expends no efforts on mental operations on the magnitude of the corrections for the approach and holding the plane on the desired course line: the computer in the SAU system does everything for him.

Practical experience in flight confirms the fact that an experienced pilot needs only two or three training flights for the control and check point in order to maintain the control indicators precisely in the center. The directing regime required redistribution of the pilot's attention in reading the instrument information, since the control and check point indicators issue the control information, and do not reflect the plane's actual position. Increased sensitivity of the indicators leads the directory signal for the control that does not depend on the piloting-navigational instruments and may sometimes fail to coincide with their readings. When flying according to the directory indicators, the pilot devotes to the control and check point approximately 60-80 percent of the total time for reading the instrument information. With correct distribution of attention, there is still enough time to monitor, according to the piloting-navigational instruments, the work of the SAU and the control of the propulsion unit on the base leg.

The authors of the article, "The Image Representation of a Flight," are right to alert pilots who, relying only on the plane's being piloted by SAU, forget to monitor the flight, for, as Major V. Ivanov justifiably notes, no one system can be absolutely reliable, if it is not backed up. Therefore, introducing an automated control system for a plane does not reduce the demands made of the pilot of knowing how to pilot the plane manually. After all, a situation could develop in which this precise method, tested in practical experience, would prove to be the most reliable. During a flight the pilot is exposed to various forces, winds and vibrations. All this has an effect on the psyche. The rapidity of the mental processes and the responding actions in many ways, or rather, directly depends on the instrument equipment in the cockpit, its arrangement, and on the pilot's perception of the information. In this sense too, the basic flying instrument—the gyrohorizon—it would appear, should be simple, reliable and give accurate qualitative and quantitative (within a range of ± 1-$2°$) information on the plane's position in space. This will make it possible, even under the most difficult conditions, to have a correct concept of the plane's position.

The automatic pilot, directory instrument and automatic landing approach system afford the pilot exceptional opportunities. But he must not make himself dependent on these devices. The pilot must constantly train himself to control the plane manually, in landing approaches according to various systems and instruments. It seems to me that Engineer-Major-General Yu. Dobrolenskiy and Colonel of Medical Services V. Ponomarenko are calling for precisely this training for the pilot.

SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

GROUP MEETS IN TALLIN ON BIOLOGICAL ASPECTS OF MALIGNANT GROWTH

Tallin SOVETSKAYA ESTONIYA in Russian 12 May 77 p 3

[Article by A. Favorskaya: "Attack on Cancer"]

[Text] On May 11 in Tallin a special scientific session of the department of medico-biological sciences of the Academy of Medical Sciences [AMN] of the SSSR began to work on the problem "Biological Aspects of Malignant Growth."

Academician-secretary of the department, Academician of the AMN SSSR S. Debov opened the session. In the name of the Central Committee of the Communist Party of Estoniya and the government of the republic, the deputy chairman of the Council of Ministers of the ESSR, A. Gren, welcomed those assembled. He made note of the fact that in our socialist society the health of the workers is of the greatest value, thus making the physicians' work so important.

Hero of Socialist Labor, Academician of the AMN SSSR N. Blokhin, Academician of the AMN SSSR L. Shabad, and others gave reports on the first day.

Leading oncologists and representatives of the largest scientific centers of the country will speak during the three day work session. The head of the section of science and educational institutions of the CC, CP of Estoniya, E. Grechkina, the minister of public health of the ESSR, V. Ryatsep, the vice-president of the AMN SSSR, Academician of AMN SSSR M. Volkov, Academicians of the AMN of the SSSR, Hero of Socialist Labor S. Anichkov, A. Avtsyn, N. Kraevskiy, B. Lapin, A. Romodanov, and others, are participating in the work of the session.

Photograph by F. Klyuchika: (from left to right) Corresponding Member AMN
SSSR N. Napalkov (Leningrad), Academicians AMN SSSR A. Romodanov (Kiev),
N. Bekhtereva (Leningrad), L. Shabad (Moscow), Hero of Socialist Labor,
Academician AMN SSSR N. Blokhin, Senior Research Fellow of the Tallin Poly-
technical Institute Ya Uybu, and director of the Oncologic Center of the
Georgian SSR L. Sharashidze.

On the eve of the session, while awaiting the guests' arrival, the director
of the Institute of Experimental and Clinical Medicine of the Ministry of
Public Health of the ESSR, Corresponding Member of the AMN SSSR, P. A.
Bogovskiy, briefly familiarized the journalists with the most important
questions which were unified by the general theme of the session, "Biolog-
ical Aspects of Malignant Growth." The basic goal, the scientist empha-
sized, was to examine the most varied aspects of cancer by that very approach.
Many achievements of contemporary oncology have become possible due to the
study of the self-same peculiarities of a phenomenon such as tumorous growth.

In addition, said the scientist, this meeting was a final measure in the
anniversary for Soviet doctors celebrating a century of experimental on-
cology, begun by the Russian scientist M. A. Novinskiy. Today, practically
all clinical and medico-biological disciplines--hundreds of various spec-
ialists--are involved in solving problems of oncology. There is, for
example, our most famous oncologist, Hero of Socialist Labor, Academician
of the Academy of Medical Sciences of the SSSR, N. N. Blokhin. Biological
aspects of malignant growth concern him primarily as a clinician. The
report of Academician AMN SSSR. L. M. Shabad is about the chemical, sanitary
aspects of the problem--about the kind of evolution the very concept of
chemical carcinogens had undergone. Through his work, Academician AMN SSSR

V. N. Orekhovich fruitfully promotes the treatment of cancer by means of enzymes. This is a very interesting topic with a great future. B. A. Lapin is very enthusiastic about studying the paths of spread of tumor-causing viruses. G. I. Abelev, our leading immunologist, is a scientist with a first-rate reputation. The immunology of tumors is a new direction in oncology. N. P. Bochkov, the director of the Institute of Medical Genetics of the AMN SSSR, the president of the All-Union Society of Geneticists, offers still another direction, the study of congenital inherited diseases including those which in the future are conducive to the growth of tumors. Moscow, Kiev, Sukhumi, Leningrad, Novosibirsk, Vil'nyus, Riga, Tallin, Tbilisi--this is the "geography" of the participants of this session of oncologists.

From the very beginning, an atmosphere of lively creative discussion arose around problems being considered in the session.

Experimental investigations of the causes and mechanism of the development of cancer do not have to lead investigators away from what is important for the clinician, do not have to retard lively contacts between theoreticians and clinicians--this is the main thought which Academician Blokhin, director of the oncological scientific center of the AMN SSSR in Moscow, one of the first speakers, addressed to his colleagues. Today, with the creation of antitumor preparations, these contacts of theoreticians and clinicians are the closest ever. Now, when representatives of many disciplines are engaged in oncology, when radio-, immuno-, and hormonal therapies are utilized, much has changed in the treatment of cancer. These changes have allowed operations to be less extensive than formerly, and have allowed many persons stricken with several other forms of cancer to be cured even without an operation.

Clinicians and experimentalists must go hand in hand in the study of a whole series of other problems in early detection, treatment, and prophylaxis of cancer. It is important that these be complex investigations, with the interested participation of the most diverse specialists. For everything that experimentalists and theoreticians do, they do for the sick.

During a break, we held a brief interview with Academician N. N. Blokhin. /Nikolay Nikolaevich, probably the most interesting thing for our readers is to find out, as it were, "first hand," about the most important recent achievements in the fight against cancer, to hear the prognoses./ [in boldface]

Cancer is a problem which, as you understand, is most widespread. And one might talk for a long time about the achievements. But, briefly, in recent times a great deal has been done not only in theoretical and experimental oncology, about which we are speaking here, but also in clinical oncology. Now numerous schemes for the combined treatment of cancer have been work out with surgical, x-ray, chemical, and other methods. The detection of the disease is improving. Actually, people die mainly because

of late diagnosis. And so, thanks to the fact that cancer shows up at an earlier stage, our increase in mortality from cancer has halted, and in women it has shown a tendency to decrease. The construction of our huge oncological scientific center continues, built, as you known, by means of voluntary unpaid labor. It has a treatment section, and latest equipment being made operational. Right now we have more than 2000 employees and 500 beds, and upon completion there will be around 7000 workers and 1400 beds. The center is also intended to be a place for international collaboration of oncologists. Already collaboration is taking place through the SEMA with the U.S. and France.

/Perhaps a few more words about the direction in which the oncologists of Estoniya are working./ [in boldface]

One can say that Estoniya ranks well with us, and in particular, the Institute of Experimental and Clinical Medicine. P. A. Bogovskiy, its director, is one of the well-known oncologists studying carcinogenic agents, including a number of new compounds. Furthermore, there is a very good oncologic clinic in your republic, and in general oncologic service is quite up to date.

Prognoses? I repeat what I already said: Medicine is steadily attacking cancer, and success, undoubtedly, will be reached through /united efforts/. [in boldface]

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

OBITUARY OF V. D. TIMAKOV (1905-1977)

[Article]

[Text] Soviet science experienced a great loss. The major Soviet scientist, Vladimir Dmitriyevich Timakov, Academician of the USSR Academy of Sciences, president of the USSR Academy of Medical Sciences, recipient of the Lenin and State prizes, Hero of Socialist Labor, deputy to the USSR Supreme Soviet and member of the CPSU since 1941 died suddenly on 21 June 1977 in his 72d year.

V. D. Timakov was born in 1905 in the village of Pustotino, Ryazanskaya Province, to a peasant family. He graduated from the medical faculty of Tomsk University in 1929.

In 1941, V. D. Timakov began to serve as People's Commissar of Health in Turkmen SSR and science director of the Turkmen Institute of Epidemiology and Microbiology; he headed the chair of microbiology of Turkmen Medical Institute starting in 1944. He was the director of the Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR AMS [Academy of Medical Sciences] from 1945 to 1953; from 1949 on, he concurrently headed the chair of microbiology of the Second Moscow Medical Institute.

In 1953, V. D. Timakov was elected academician-secretary of the USSR AMS, and served as its vice-president from 1956 to 1964.

In 1968, V. D. Timakov was elected president of the USSR AMS, an office he held until he died.

As director of the Institute of Epidemiology and MIcrobiology imeni N. F. Gamaleya, USSR AMS, Vladimir Dmitriyevich headed the laboratory of comparative immunity, which was subsequently converted into the laboratory of microbiology. The production of bacterial preparations was reorganized and their efficacy increased on the basis of the results of research on the antigenic structure of microorganisms, their immunizing properties and patterns of formation of immunity, obtained by this talented scientists, and the State Prize was bestowed upon V. D. Timakov for this work.

From 1949 on, V. D. Timakov organized research in the laboratory and chair which he headed, mainly dealing with variability of microorganisms, and in particular that of filtrable forms. In time, this problem acquired more and more importance; studies began of L forms and efforts were made at selective alteration of bacteria.

This scientist concentrated on the search for control of heredity of microorganisms and deliberate alteration thereof; all of his subsequent scientific endeavors were devoted to this quest. Of basic importance was his position that there was a need to develop means of selectively affecting the genetic system of bacteria, the feasibility of which was denied by the conceptions of classical genetics prevailing at that time. It is known that the invalidity of these conceptions was proven with the development of genetic science.

At the present time, the use of various mutagens has made it possible to induce specific structural changes in DNA; methods have been developed for obtaining mutations localized in relatively circumscribed regions of the chromosome and for engineering the genomes of microorganisms. Thus, controlled variability of microorganisms became a reality.

Foreseeing this prompted V. D. Timakov not only to start his own research in the direction of genetics, but to realize that it was necessary to draw the attention of Soviet researchers to the data of universal science dealing with the study of the material nature of genetic determinants.

Vladimir Dmitriyevich directed the research in his laboratory, as well as the chair of microbiology toward solving problems related to the genetic mechanisms of heredity and variability of bacteria. As supervisor of the laboratory and chair, he tried to draw the scientific interests of these groups closer together; the chair of microbiology produced qualified scientific personnel.

Vladimir Dmitriyevich opened a department of general medical microbiology, based at the laboratory; the former now consists of nine laboratories and represents one of the prominent microbiological research groups of our country.

In developing genetic research, V. D. Timakov remained loyal to his calling as a medical microbiologist; he directed his genetic research toward the problems of medical microbiology. It is expressly through the study of

problems having a bearing on medical microbiology that his school was formed, and it was united by the common goal of finding the means of controlling heredity of microorganisms.

Research dealing with the genetic and molecular biological mechanisms of vital functions of bacteria, their resistance to exogenous agents and bases of their pathogenic action led to this goal. Investigations on the mechanisms of mutational variability, genetic bases of virulence, genetic mechanisms of regulation, mechanisms of transfection and transformation of bacteria, repair of injuries to genetic material, the pathogenetic role of altered bacterial forms, persistence of viruses and mycoplasma, immunology of nucleic acids, etc., served the interests of medical microbiology. V. D. Timakov was awarded the Lenin Prize for a cycle of works dealing with the role of L forms of bacteria and mycoplasma in pathology.

The research conducted by the school of V. D. Timakov gained recognition, both in our country and abroad.

The successful development of work in the above-mentioned directions was largely attributable to the particular talent of V. D. Timakov to select and train scientific personnel. Growth thereof was the result of the style of scientific guidance by Vladimir Dmitriyevich, who constantly provided guidelines and, at the same time, complete freedom of creative initiative, allowing for broad scientific debate and creating an atmosphere of complete confidence, benevolence and understanding.

More than 40 doctoral and candidatorial dissertations were prepared under his supervision. This scientists authored 8 monographs and more than 250 articles.

The scientific endeavors of V. D. Timakov are far from being limited to supervision of a department and chair. For many years he was constantly instrumental in the inception and development of microbiological genetic research on a national scale. As the chairman of the problem commission on genetics of microorganisms (presently called "Genetics and Molecular Biology of Bacteria"), he aided in development of genetic research in the scientific research institutions within the system of the USSR AMS and Ministry of Health.

When speaking about Vladimir Dmitriyevich Timakov, we cannot fail to mention his active condemnation of attempts at adding a pseudoscientific element to development of Soviet microbiology. Irreconcilability with anything that obstructs development of science and utmost involvement in all that was progressive were the basic principles in this scientist's life.

The activities of V. D. Timakov as an organizer of medical science and public health are of great importance. He held the office of people's commissar of health of Turkmenia during the difficult war years. After the war, he played a large part in the inception of Soviet medical microbiology as director of a prominent scientific institution of our country, the Institute of

Epidemiology and Microbiology imeni N. F. Gamaleya. As president of the USSR AMS, V. D. Timakov displayed his brilliant skills as an organizer of medical science and public health. He was elected three times to this high office.

Through his research, Vladimir Dmitriyevich made a large contribution to development of the general principles of eradicating a number of infectious diseases, investigation of the patterns of the epidemic process, ways and means of preventing infectious diseases, theoretical and applied immunology.

Along with multifaceted scientific, organizational and pedagogic activities, V. D. Timakov did much national and public work. He was elected delegate to the 24th and 25th CPSU congresses, deputy to the USSR Supreme Soviet of the 9th convocation, chairman of the commission for public health and social security of the council of nationalities of the USSR Supreme Soviet.

The title of Hero of Socialist Labor, two Orders of Lenin, the Order of the October Revolution, two Orders of the Red Banner of Labor and medals were awarded to V. D. Timakov for his outstanding achievements in development of medical science and public health.

The demise of Vladimir Dmitriyevich Timakov is a great loss for all of Soviet science and public health.

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